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GADD (C. H.) & LOOS (C. A.). **The fungus Exobasidium vexans.**—*Tea Quart.*, 20, 2, pp. 54–61, 2 pl., 1949.

This paper contains a detailed description of the tea blister blight fungus *Exobasidium vexans* in Ceylon [*R.A.M.*, 29, pp. 175, 250]. The time required for spore germination and penetration varied with external conditions. Spores from the same blister germinated on glass had fairly long germ-tubes after 4½ hours at 25° C. which appeared to be the optimum [ibid., 28, p. 145]. Spores also germinated in 1½ hours at 20°. The fungus gained entry into the leaf through any part of the cuticle in eight hours at 20° under laboratory conditions. The hyphae frequently branch within subepidermal cells but later growth is intercellular. The invaded cells enlarge usually towards the lower surface. Spores are produced on an average about 18 (14 to 21) days after infection has occurred. The authors state that removal of shade trees from all tea areas would not result in eradication of the disease; shade should, however, be controlled so that sunlight is admitted into the area when it is likely to be beneficial [see next abstract].

PORTSMOUTH (G. B.) & LOOS (C. A.). **Blister blight—a review.**—*Tea Quart.*, 20, 2, pp. 77–84, 1949.

The three main avenues of control for blister blight of tea (*Exobasidium vexans*) [see preceding abstract] in Ceylon are considered to be (1) protection of susceptible material with fungicides, (2) modification of existing cultural practices, and (3) establishment of clones resistant to blister blight. The hilly terrain and tall shade trees make spraying from the air impracticable. A fog applicator under trial at Bogawantalawa, using copper oxychloride in an oil emulsion or copper oxide in water, did not give a satisfactory protective covering beyond 10 yds. At present attention is being concentrated on small power-spraying outfits worked by a low horse-power petrol engine. On estates lying in mist belts, where dry weather conditions are not long enough to allow a complete recovery in favourable weather, growers are advised to protect pre-tipping growth with a reliable copper fungicide. Nursery plants may also be protected with copper sprays.

Blister blight attack on tea in plucking is in two phases, leaf only, and stem and leaf infection. In the former case the recommendation is to pluck two leaves and a bud as usual but at more frequent intervals; in the latter, where the whole shoot may become useless, it is advisable to pluck down to the fish leaf. In misty areas controlled felling of shade trees to let the sun in early in the morning is advised. Bushes for propagation should be selected during a severe blister blight attack.

LINN (M. B.) & EMGE (R. G.). **Development of anthracnose and secondary rots in stored Tomato fruits in relation to field spraying with fungicides.**—*Phytopathology*, 39, 11, pp. 898–906, 1949.

A tabulated survey is given of studies covering the period from 1945 to 1948 at

the University of Illinois, Urbana, on the development of anthracnose (*Colletotrichum phomoides*) and secondary rots (soft rot bacteria, *Rhizopus* sp., and *Oospora* sp.) of tomato fruits (Illinois T-19 in 1945 and Garden State in the following years) sprayed during the season with various fungicides. Data were collected on the extent of defoliation from early blight (*Alternaria solani*), the incidence of anthracnose at harvest, and the amount of infection by *C. phomoides* and secondary rots in selected U.S. No. 1 fruit held in storage for several days after harvest [*R.A.M.*, 28, p. 314].

The efficiency ratings of the fungicides based on harvest data were not materially altered by the development of anthracnose in storage. In general, zerlate (2 in 100) alone, tribasic copper sulphate (4 in 100) alternating with zerlate or fermate (2 in 100), and dithane D-14 plus zinc sulphate (2 qt.–1 lb.–100) were rather superior to the other compounds tested in anthracnose control. Defoliation seemed to be an important factor in anthracnose development in most of the tests, but in 1948 severe infection by *C. phomoides* occurred without loss of leaves. For some reason unknown, secondary rots were more prevalent in sprayed than in unsprayed fruits. Storage reduces to a minimum the effects of the related factors of defoliation and exposure of fruit to high temperatures which enhance susceptibility to anthracnose. It would also appear to be useful in that the stage of fruit maturation is difficult to determine from skin coloration alone. Hence fungicidal efficiency against the disease can be more accurately assessed by determining the incidence of infection on stored fruits than by reliance on harvest records alone.

Gallegly (M. E.) & Walker (J. C.). **Relation of environmental factors to bacterial wilt of Tomato.**—*Phytopathology*, 39, 11, pp. 936–946, 1949.

At the Department of Plant Pathology, University of Wisconsin, young Bonny Best tomato plants were subjected to various environmental conditions, involving differences in soil and air temperature, soil moisture, day length, and light intensity, for a 30-day period before inoculation with the agent of bacterial wilt (*Pseudomonas* [*Xanthomonas*] *solanacearum*) [*R.A.M.*, 23, p. 462], only one factor being varied in each experiment [ibid., 29, p. 181]. After inoculation the plants were rearranged and again exposed to varying degrees of each particular factor. Results were thus obtained which showed the effect of pre- and post-inoculation environmental factors on the development of the disease.

The post-inoculation experimental data showed that infection increased with rising soil and air temperatures up to 36° and 28° C., respectively. Disease development was greater at low light intensity (100 to 400 foot-candles) and short day lengths (6 and 12 hours) after inoculation than at normal light intensity (400 to 1,600 foot-candles) and 18-hour days. At optimal and high soil moisture levels (80 and nearly 100 per cent. water-holding capacity) disease development was greater than at the low level of 40 per cent.

In general, the incidence of infection was less affected by pre- than by post-inoculation factors, the latter in any case being of paramount importance in the development of bacterial wilt.

Hartley (C.). **Fungicides for forest trees, shade trees and forest products.**—*Bot. Rev.*, 16, 1, pp. 33–50, 1950.

This critical survey of fungicides used for the control of forest and shade tree diseases and the treatment of forest products is based on 41 contributions to the relevant literature. It deals with tree spraying and dusting, tree injection, wound protection, seed and soil treatments, and short- and long-time protection of forest products.

Carter (J. C.). **Oak wilt in Illinois.**—*Plant Dis. Reptr*, 34, 3, pp. 81–82, 1 fig., 1 map, 1950. [Multilithed.]

Oak wilt (*Chalara quercina*) [*R.A.M.*, 29, p. 82] is widespread in Illinois and occurs generally in the north, north-west, and also in some north-eastern and southern areas. Burr oaks [*Quercus macrocarpa*] were observed to die within a single growing season in 1948 and 1949 in various localities. In the Forest Preserve District of Cook County, the major recreational region of Chicago and vicinity, 72 infected trees were found in widely separated areas in 1949. In the Sinissippi Forest it is estimated that 50,000 board feet of lumber have already been obtained from dead trees and the same amount remains to be salvaged.

Bondartzev (A. S.). Заметка о грибе **Polyporus buxi** на Самшите. [Notes on the fungus *Polyporus buxi* on Box.]—*Trav. Soc. Nat. Leningr.*, 34, 3, pp. 296–298, 1 fig., 1949.

In 1948 the author found in a State forest preserve in the Caucasus a bracket fungus on the stem of box [*Buxus sempervirens*], which closely resembled *Polyporus buxi* described by Branke (*Lyes. Zh.*, 24, 6, p. 473, 1894) and not recorded since that date. It differed, however, in the size of the pores and spores and in the morphology of the latter. The author considers that the two fungi are most probably forms of the variable *Phellinus* (*Fomes*) *robustus* [*R.A.M.*, 12, p. 795; 25, p. 239; 28, p. 498], with which the Caucasian species also closely agrees.

Webster (C. C.) & Wiehe (P. O.). **Die-back of Tung trees.**—*Plant Dis. Circ. Nyasal.* 1, 4 pp., 1950. [Mimeographed.]

Tung trees (*Aleurites montana* and *A. fordii*) in Nyasaland are affected by a die-back [cf. *R.A.M.*, 28, p. 271] caused by a species of *Botryosphaeria*. Recently, the disease has become markedly more prevalent. The twigs and branches of affected trees suddenly wilt, usually early in the growing season. The fungus lives within the infected branch and spreads to the trunk. Externally the bark of an affected branch is dark brown, and it soon becomes shrunken and withered. The wood is brown or yellowish-brown; broken streaks pass into the living wood for a distance of several inches beyond the brown lesions on the bark. Later, spores form in small black pustules scattered over the surface of the dead wood.

All infected branches should be cut to a point where no brown dots are found in the living wood. The cutting implements should be dipped in a 1 per cent. lysol solution between cuts, which should be effected before leaf fall, preferably while the trees are dry. All cut surfaces should be painted at once with warm fungicidal paste. The severed stems should be burnt.

Widder (F.). **Untersuchungen über forstschädliche Cronartium-Arten. (2. Mitteilung.)** [Studies on *Cronartium* species pathogenic in the forest. Note 2.]—*Mitt. naturw. Ver. Kärnten*, 137–138, pp. 82–93, 1 map, 1948.

Ten years ago only about four foci of the heteroecious pine (*Pinus sylvestris*) blister rust, *Cronartium gentianeum* [*R.A.M.*, 18, p. 644], had been recorded, but since that time several hundred new ones have come to light in the eastern section of the range covered by the alternate host, *Gentiana asclepiadea*, particularly along the fringe of the Alps. The aecidiospores produced on the cortex of the pine germinate almost exclusively on *G. asclepiadea*, giving rise to uredo- and ultimately to teleutospores, which re-infect the pine. While the spread of the disease does not imminently endanger Austrian silviculture, it may well do so in the future with a shift in the biological equilibrium to the advantage of the parasite.

GORDON (M. A.). **The physiology of a blue stain mold with special reference to production of ethyl acetate.**—*Mycologia*, 42, 1, pp. 167–185, 8 figs., 1 graph, 1950.

A description is given of the physiology of a blue stain mould of shortleaf pine wood (*Pinus echinata*) identified as *Endoconidiophora moniliformis* [*R.A.M.*, 14, p. 729; 22, p. 413] and of the conditions under which it produces ethyl acetate.

ALLIOT (H.). **Méthode d'essais des produits anticryptogamiques.** [A method for testing fungicidal products.]—*Bull. tech. Inst. nat. Bois* 1, 27 pp., 12 figs., 1945. [Received June, 1949.]

A method of testing wood preservatives employed at the Laboratoire Central d'Essais des Bois, Paris [*R.A.M.*, 25, p. 376], is described. Fungistatic ability is determined by mixing 5 c.c. nutrient beech sawdust agar with different amounts of the fungicide, the fungus being grown on this medium at 24° C. and a humidity of 97 per cent. The lowest concentration of fungicide at which no growth has occurred after one month is the 'dysgenesic threshold' [ibid., 16, p. 291]. Fungicidal efficiency is determined by testing the fungus mycelium in each of three concentrations, 1, 2, and 3 per cent., of the product for varying lengths of time up to four days. Tests are then made, using 3 by 1 by 0·5 cm. blocks of Scots pine, beech, and oak, impregnated with the fungicide. The test fungi [ibid., 27, p. 303] are (for forest trees) *Polystictus versicolor*, for constructional wood *Merulius lacrymans*, for Scots pine poles *Xanthocrous* [*Fomes*] *pini* [ibid., 25, p. 376], for oak sleepers *Daedalea quercina*, and for beech sleepers *Lentinus* [*Xerotus*] *degener*. The test blocks, dried at 105°, impregnated with fungicide, dried at 25° for three weeks, and re-moistened by Lutz's cold vacuum method, are placed in contact with the fungus in culture, the tubes being kept for four months at 24° and at any suitable humidity. The blocks are dried at 105° and the percentage loss of weight indicates the severity to decay.

Finally leaching tests are made in which drops of water are allowed to fall, by means of a special apparatus, on the blocks which have resisted infection in the previous experiment until covered, the operation being repeated, five times counting as one leaching. If still uninfected after inoculation, further leaching is carried out; if, on the other hand, they become infected, the operation is repeated on another similar block, using fewer leachings. This gives the resistance of the product to leaching.

Examinations are also made of poles and sleepers impregnated by industrial methods, using small sample blocks from various regions of the piece.

FÅHRAEUS (G.). **On the oxidation of phenolic compounds by wood-rotting fungi.**—*Ann. LantbrHögsk., Stockh.*, 16, pp. 618–629, 1949.

At the Royal Agricultural College, Uppsala, a number of wood-rotting fungi, including *Polyporus* [*Polystictus*] *versicolor*, *Polyporus zonatus*, *P. hirsutus*, *P.* [*Polystictus*] *abietinus*, *Stereum purpureum*, *S. hirsutum*, *S. rugosum*, *Marasmius scorodonius*, *Coniophora puteana*, *Trametes heteromorpha*, and *Lentinus lepideus*, were grown in pure culture on agar plates containing phenols or aromatic amines, some of which were used in experiments on the isolation of lignin-decomposing fungi from the soil [*R.A.M.*, 29, p. 68]. Plates with an admixture of tannic acid (0·002 M) [ibid., 29, p. 45] were inoculated with soil, and mycelia forming dark zones isolated. One of the fungi thus obtained was grown on wheat straw and found to decompose lignin to a slight extent. At 0·01 to 0·001 M α-naphthol selectively inhibits all the fungi tested except those decomposing lignin, which are able to

oxidize the compound. The germination of all the spores tested was totally inhibited at 0·0005 M. The addition of α-naphthol to agar plates facilitated the isolation of some lignin-decomposing fungi from heavily infected material.

Moore (W. D.). **Flooding as a means of destroying the sclerotia of Sclerotinia sclerotiorum.**—*Phytopathology*, 39, 11, pp. 920–927, 1949.

Following up Brooks's demonstration that a combination of flooding and soil treatment with cyanamide would kill a large percentage of the sclerotia of *Sclerotinia sclerotiorum*, which has been causing increasingly heavy losses in vegetable crops of recent years, in muck soils in Florida (*Pr. Bull. Fla agric. Exp. Sta.* 567, 1942), a series of experiments on this method of control was conducted in the south of the State from 1945 to 1947 [cf. *R.A.M.*, 28, p. 45].

Flooded in marl, muck, or sandy soils, the sclerotia decayed completely within 23 to 45 days, irrespective of the depth of burial (down to 2 in.). Disintegration proceeded with equal rapidity when the ground was alternately flooded and drained at three-day intervals as when flooding was continuous. The addition of green organic matter to the soil surface did not accelerate the rates of sclerotial decay during periods of flooding. Sclerotia subjected to flooding in the field rotted at approximately the same rate as under laboratory conditions. The decay of the sclerotia in commercial fields, exposed only to the prevailing rainfall, was slow and incomplete.

1950 all-American selections.—*Prof. Gdnr*, 2, 1, p. 9, 1950.

Topcrop, a new snap bean [*Phaseolus vulgaris*], is immune from bean mosaic virus [*R.A.M.*, 28, p. 105; 29, p. 284] and greasy pod or shiny pod disease [see below, p. 345]. Congo watermelon is highly resistant to anthracnose [*Colletotrichum lagenarium*: ibid., 28, p. 48], but not to downy mildew [*Pseudoperonospora cubensis*] or *Fusarium* wilt [*F. bulbigenum* var. *niveum*: loc. cit.].

Mahmud (K. A.). **Damping-off of Cabbage, Cauliflower and Knolkohl caused by Pythium aphanidermatum (Eds.) Fitz.**—*Curr. Sci.*, 19, 2, pp. 67–68, 8 figs., 1950.

During October, 1948, damping-off of cabbage, cauliflower, and kohlrabi seedlings due to *Pythium aphanidermatum* [*R.A.M.*, 8, p. 448; 24, p. 488; 27, 483] occurred at Nagpur, India. In pathogenicity tests seedlings growing in pots in soil infested with the isolates first became infected when three days old and the fungus was successfully re-isolated. Seedlings in control pots remained healthy. The isolates, identical in culture, were more virulent on cauliflower than on cabbage or kohlrabi.

McLean (D. M.). **A progress report on the experimental application of dusts and sprays to Cabbage seed plants for control of Sclerotinia stalk rot.**—*Plant Dis. Reptr*, 34, 3, pp. 78–79, 1950. [Multilithed.]

Experiments conducted at Mount Vernon, Washington, in 1949 indicated that artificial defoliation to reduce the primary foliar infections of cabbage seed plants caused by *Sclerotinia sclerotiorum* [*R.A.M.*, 28, p. 555] significantly reduced the total number of stalk infections. Spraying and dusting treatments with various fungicides again failed to give satisfactory control [loc. cit.]. It appears that the disease might be combated by proper timing of spray applications, with plants spaced to enable thorough coverage.

Huber (G. A.) & Gould (C. J.). **Cabbage seed treatment.**—*Phytopathology*, 39, 11, pp. 869–874, 1949.

Of the diseases attacking cabbages grown for seed in Western Washington, *Mycosphaerella brassicicola* sometimes causes damage, especially in years with a

wet spring or early summer. The fungus was found on the lower leaves of plants in the plant beds, and evidence was obtained that it penetrates the seed coat, producing lesions on the underlying cotyledons in a number of cases. At the Western Washington Experiment Station from 1941 to 1943, 20 minutes' treatment of cabbage seed with water heated to 45° C. caused little or no injury and was effective in the destruction of various seed-borne fungi, including *M. brassicicola* [*R.A.M.*, 26, p. 519]. However, the germinability of three-year-old seed of the Marion Market, All Head, and Danish Ballhead varieties was definitely reduced by the treatment (from 86·5 to 62·2, 77·2 to 69·5, and 50·2 to 47 per cent., respectively). Highly significant increases in stand were secured by a number of double treatments, i.e., immersion in hot water as above, followed by the application, 60 hours later, of various chemicals, of which the most effective were tersan and arasan, both at 1 per cent., resulting in percentages of 85 and 83 respectively, as against 44·6 for the controls.

PRENTICE (I. W.). **Broccoli mosaic.**—*J. Minist. Agric.*, 56, 12, pp. 577–579, 3 figs., 1950.

The occurrence in Britain, symptoms of, and preventive measures for broccoli mosaic (cauliflower mosaic virus) [*R.A.M.*, 24, p. 259; 28, p. 321] are given. If the usual procedure is unsuccessful farmers are advised to modify crop rotation so that the farm is free from all types of *Brassicae* for at least a month, raising seedlings in another area, or leaving broccoli out of the rotation for a year.

AYERS (G. W.). **Club root studies. Root hair infection in Swedes and other crucifers.** —Abs. in *Proc. Canad. phytopath. Soc.*, 17, p. 16, 1950.

Studies carried out at Charlottetown, Prince Edward Island, showed that the club root organism (*Plasmodiophora brassicae*) [cf. *R.A.M.*, 29, p. 142] can infect the root hairs of resistant and susceptible swedes with equal facility, indicating that resistance is not carried in the root hairs, which are merely utilized by the fungus as a means of self propagation [ibid., 28, p. 431]. The zoospores from the sporangia in the root hairs were discharged through openings in the cell wall of the hair. *Lepidium densiflorum* proved the most promising of 16 cruciferous plants tested for suitability for zoosporangial studies.

BJÖRLING (K.). **Virusgulsot hos Betor. Sjukdomsbild och inverkan på den svenska Sockerbetskorden.** [Virus yellows of Beets. Symptoms and influence on the Swedish Sugar Beet yield.]—*Socker Handl.*, 5, 7, pp. 119–140, 4 col. pl., 1 fig., 2 graphs, 2 maps, 1949. [English summary.]

During 1944 and 1945 a marked extension in the yellowing of sugar beet leaves was observed in the west of Scania, and from 1946 to 1948 investigations were conducted to determine the cause and distribution of the disease. The symptoms of the chlorosis, which was found to be due to virus yellows [*R.A.M.*, 29, p. 132 and next abstracts], are fully described.

One of a series of field experiments to ascertain the relative importance of the vectors *Doralis* [*Aphis*] *fabae* and *Myzus persicae* in the transmission of yellows was performed near Stockholm, where the disease does not occur naturally. Three plots were infected in mid-June with viruliferous *M. persicae* on one plant in the centre, and three other plots in the same way with *A. fabae*. The aphids were then allowed to increase and spread without interference. Although the population of *A. fabae* was much larger, *M. persicae* was a great deal more active in the dissemination of the virus, the plants contaminated by the two species numbering 11 and 222, respectively. Further evidence as to the predominance of *M. persicae* as a vector was obtained in 1947, when the spread of yellows was about ten times greater in the western than in the eastern part of the province, probably owing to the

correspondingly higher frequency of the peach aphid in the former area, although the quantity of virus accessible to both vectors in known sources of infection at the beginning of the summer was approximately equal in the two regions and *A. fabae* was unusually numerous. In 1946 *M. persicae* was about three times, and in 1948 over 20 times more prevalent in the west of Scania, presumably owing to the large number of greenhouses in that part of the province.

In experiments (replicated five times) in 1947 and 1948 at Landskrona, the plants were infected individually with 5 to 10 viruliferous peach aphids early (15th June) and late (15th July). The resultant losses of sugar were estimated at 19 and 16 decitons (35 and 29 per cent.) per ha., respectively, and are therefore somewhat lower than those reported from England [ibid., 25, p. 533]. Furthermore, a considerable deterioration in the quality of the diseased beets is noticeable, expressed in the substantially increased quantity of noxious nitrogen. In another small experiment (four replications) in 1948 near Stockholm, where the risk of extraneous infection did not arise and secondary spread from diseased plots was checked by repeated spraying with E 605 [ibid., 29, p. 276], plants were inoculated at three dates, viz. 10th and 30th June (at the singling stage, 8 to 10 leaves) and 20th July, resulting in yield reductions of 77·8, 61, and 34·4 per cent., respectively. These data, however, are only of theoretical interest, since such early infections do not appear to occur in Sweden.

In a storage trial in 1946–7 with 150 healthy and 150 diseased 'stecklings', 112 of the former and 67 of the latter survived the severe winter. The seed stalks produced by 80 healthy and 67 diseased 'stecklings' planted in the spring numbered 64 and 22, respectively.

Beet seed crops appear to constitute the most important source of infection known at present, but other possibilities are not excluded, and in order to study them all beet seed crops were removed in 1949 from an area covering about 600 sq. km. in western Scania. Wind-transported aphid catches between Denmark and Sweden point to the potential transmission of virus yellows in this manner. In July, 1947 and 1948, 214 living specimens (11 per cent. *M. persicae* and 48 per cent. *A. fabae*) were caught in the Öresund with a net 1m. in diameter during a 20-hour exposure. None of the aphids proved to be viruliferous, but no definite conclusions can be drawn from this negative result in view of the small number tested.

Pending further studies, the protection of 'steckling' crops against virus infection is considered to be the best control measure. Breeding experiments with a view to the development of a tolerant or resistant variety are in progress at the Hilleshög Institute.

Ernould (L.). **Les ennemis et maladies de la Betterave, en Belgique, en 1948.** [The pests and diseases of Beet in Belgium in 1948.]—*Publ. Inst. belge Amélior. Better.*, 16, 6, pp. 313–319, 1948. [Flemish and English summaries.]

The season of 1948 in Belgium was abnormally early and wet, especially during July. Black leg [*Phoma betae*, *Pythium debaryanum*, and *Aphanomyces laevis*, *R.A.M.*, 18, p. 287] was more or less ubiquitous in beet seed-beds, causing 1 to 15 per cent. infection before transplanting and thinning out, except in one field with a pH of 5·5, where the damage was much heavier.

A severe outbreak of bacterial gummosis [*Bacillus betae*: ibid., 25, p. 439], believed to be the first in the country, was observed on 5th June in a 50 are [1 are = 119·6046 sq. yds.] sugar beet field at Kessel-Loo, in some parts of which over 50 per cent. of the plants were affected. Later the disease was found involving a smaller area near Tirlemont.

Cercosporosis [*Cercospora beticola*] was favoured by the high degree of atmospheric humidity. By October nearly half the leaves were lost in some areas.

The violet *Rhizoctonia* [root rot: *Helicobasidium purpureum*] was much more

virulent than in 1947, nearly 20 per cent. of the plants being attacked in one of the fields inspected. Surveys made of virus yellows [ibid., 27, p. 345; cf. also preceding abstract] in various parts of the country during August revealed percentages of infection ranging in the province of Hesbaye from 5 to 25 and in Hainault and Western Flanders from 20 to 100. The symptoms of the disease may be more or less masked on plants growing in soils containing an abundance of humus. Beet mosaic virus was unimportant except on fodder beet seed-bearers in certain districts, e.g., parts of Hainault.

ERNOULD (L.). **Les maladies et les ennemis de la Betterave en Belgique en 1947.** [The diseases and pests of Beet in Belgium in 1947.]—*Publ. Inst. belge Amélior. Better.*, 16, 2, pp. 61–68, 6 graphs, 1948. [Flemish and English summaries.]

The year 1947 was the driest in Belgium since the beginning of the century. Virus yellows [see preceding abstracts] developed very early (20th June onwards) and beet mosaic virus occurred in a severe form.

The depredations of *Atomaria* [*linearis*] paved the way for invasion by the agents of black leg [*Phoma betae*, *Pythium debaryanum*, and *Aphanomyces laevis*], a disease often associated with patches of acidity.

It was again observed that some lots of seed produce beets which are more susceptible than others to *Cercospora* [*beticola*: *R.A.M.*, 13, p. 210 *et passim*]. This is because the seed-bearers are more heavily infected than the plants of the current year. Under favourable conditions the conidia germinate in the flowers and the mycelium develops on the seeds, resulting in more or less severe infection according to the climatic conditions prevailing at the time of ripening and of harvesting the seed-bearers. The mycelium in the seed may then be condensed into a stroma. The seed, however, is not the primary agent in the transmission of the disease, other contributory agencies being wind, soil, and beet refuse.

LUCHETTI (G.). **Nota preliminare su una 'batteriogommosi' della Barbabietola.** [Preliminary note on a 'bacteriogummosis' of Beet.]—*Notiz. Malatt. Piante, 1949*, 5, pp. 17–25, 1949. [Mimeographed.]

In August, 1947, sugar beets growing in recently reclaimed, irrigated land at S. Biagio d'Argenta, Ferrara, and Classe, Ravenna, were affected by a condition referred to locally as 'heart rot'. The affected plants had only a few, small young leaves, the remainder having died and fallen off. The roots had wilted and on being cut emitted a transparent, gummy liquid containing numerous bacteria. Inoculations with cultures of the bacteria were negative and the wilt symptoms appeared to be due to prolonged drought. Root grafting failed to transmit the symptoms. The condition appears to be identical with the bacteriogummosis described in 1891 by both Kramer (*Öst. landw. Zbl.*, 1, pp. 30, 40) and Sorauer (*Z. PflKrankh*, 1, p. 360).

AFANASIEV (M. M.) & MORRIS (H. E.). **Effect of fertilization on the recovery of transplanted Sugar-Beet seedlings affected with Aphanomyces cochlioides Drechsl. in the greenhouse.**—*Phytopathology*, 39, 12, pp. 1001–1004, 1949.

One-month-old sugar beet seedlings in soil infested with *Aphanomyces cochlioides* at the Montana Agricultural Experiment Station in 1948 showed a remarkable recuperative faculty when transferred to soil flats fertilized with various combinations of nitrogen, phosphorus, potassium, and manure, the last-named plus the three fertilizers giving particularly beneficial results [*R.A.M.*, 28, p. 611]. This treatment increased the average height of the healthy, slightly, and severely diseased plants from 8, 6, and 5 to 36, 23, and 26 cm., respectively; the top weights per plant from 3·5, 2·2, and 1·7 to 68·3, 20·5, and 40·8 gm., respectively; and the root weights from 0·3, 0·3, and 0·3 to 6·2, 1, and 4 gm., respectively.

Gould (C. J.). **Ascochyta pinodella footrot of Peas in Western Washington.**—*Phytopathology*, 39, 11, pp. 947–949, 1 fig., 1949.

Studies covering the period from 1943 to 1946 showed that *Ascochyta pinodella* [*R.A.M.*, 26, p. 91] was responsible for about three-quarters of the increasingly heavy losses accompanying intensification of pea cultivation for canning and freezing in Western Washington, while *Aphanomyces* sp. [ibid., 27, p. 509], *Fusarium* spp. [ibid., 29, p. 133], and *Rhizoctonia* accounted for most of the remainder. Yield reductions due to *Ascochyta pinodella* were heaviest in hot, dry seasons.

Sectoring and variations in mycelial growth rate, colour, consistency, and the like, were a marked feature of monospore cultures of the foot rot pathogen.

Dwarf Gray Sugar (Northrup King) was the most promising of all the varieties and strains (over 500) subjected to extensive tests for resistance to *A. pinodella* [cf. ibid., 27, p. 270]. Encouraging results were also obtained in small-scale trials with a Shoemaker strain from Honan, China (labelled No. 914, Acc. No. 27625–2), and VA 2, a selection from Weimer's H 251–11–E (Austrian Winter × FC 18074). Other Shoemaker strains with a measure of resistance were D'Hollandia (655), De Grace White Dwarf (656), Peulen de Grace (861), and Chang (894), while two fairly resistant market types were Horsford Market Garden (Associated Seed Growers) and Famous (Rogers Bros.). Pending the gradual development of a resistant variety, rotation appears to be the sole practicable means of combating this form of root rot in Western Washington.

Skiles (R. L.) & Thomas (W. D.). **Red node and shiny pod viroses of field Beans.**—Abs. in *J. Colo.-Wyo. Acad. Sci.*, 3, 6, p. 44, 1948.

Field observations in Mesa County, Colorado, during the summer of 1947 showed that the 'red node' disease [*R.A.M.*, 29, p. 72] of field beans [*Phaseolus vulgaris*] caused losses in individual fields often amounting to 75 per cent. In the late summer two viruses were found to be involved in the production of the observed symptoms, that of 'red node' causing principally leaf vein and nodal reddening, while the 'shiny pod' virus was chiefly manifested by a red blotching of the pods. In preliminary greenhouse tests plants grown from seed from plants with 'red node' and 'shiny pod' showed the characteristic symptoms of each disease. Tobacco streak virus [ibid., 28, p. 85] transmitted to beans caused reddening of leaf veins, nodes, and pods.

Burke (D.) & Starr (G. H.). **Direct measures used on control-tests of bacterial blight of Beans.**—Abs. in *J. Colo.-Wyo. Acad. Sci.*, 3, 6, p. 43, 1948.

Treatments to destroy the causal organism of common blight [*Xanthomonas phaseoli*] of beans [*Phaseolus vulgaris*] and others to prevent or reduce secondary infection in plants were tested. Four treatments, including a combination of dry heat and new improved ceresan and heating the seeds at 60° C. for 24 hours and at 80° for 30 minutes, effected a substantial reduction in the number of infected plants from diseased French Horticultural seeds without reducing germination. Seven commercial fungicides lowered the incidence of common blight both on mechanically damaged (to simulate hail) and undamaged plants. Bordeaux (12·75 per cent., puratized spray (5 per cent., 1 in 800), and cuprox dust (copper oxychloride) were the best treatments on 'hail'-damaged plants, while Bordeaux spray, Bordeaux dust (12·75 per cent. copper), and puratized spray were the most effective on undamaged ones. None of the treatments gave complete control.

Frazier (W. A.) & Hendrix (J. W.). **Hawaiian Wonder. New rust-resistant pole green Bean.**—*Circ. Hawaii agric. Exp. Sta.* 28, 7 pp., 3 figs., 1949.

This paper deals with a new pole green bean [*Phaseolus vulgaris*] named Hawaiian Wonder developed in Hawaii, especially for resistance to rust [*Uromyces*

appendiculatus], from the cross Bountiful × Lualualei [*R.A.M.*, 28, p. 502]. It is best adapted to winter crops at high elevations where bean rust is a limiting factor.

KERNKAMP (M. F.). **Root rots of Soybeans.**—*Soybean Dig.*, 9, 11, pp. 54–55, 3 figs., 1949.

Preliminary observations and experiments in Minnesota indicate that *Rhizoctonia* [*Corticium*] *solani*, the agent of damping-off and root rot of soy-bean [*R.A.M.*, 28, p. 155], is potentially the most destructive pathogen of the crop in the State, where the wide host range and numerous physiologic races of the fungus greatly complicate the development of control measures. Trials are in progress, however, to determine the possibilities of control along three lines, namely, crop rotation, seed treatment, and breeding for resistance.

MCKEEN (C. D.). **Preliminary studies on a Pythium rootrot of Spanish Onion seedlings.**—*Sci. Agric.*, 30, 3, pp. 125–131, 2 pl., 1950.

A rootrot of Spanish onion seedlings, occurring in both steamed and non-steamed glasshouse soils, has recently become of economic importance in south-western Ontario [cf. *R.A.M.*, 28, p. 117]. The disease appears from four to seven weeks after sowing, generally in patches in the flat. Symptoms are wilting, yellowing of the tips of younger leaves, and complete blanching and ultimate death of the older ones. Affected seedlings are stunted and the roots severely decayed. The oldest roots have a tendency to bulb and produce new adventitious roots.

Pythium irregulare was isolated from diseased plants and in infection experiments caused pre- and post-emergence damping-off. Post-emergence mortality was extensive (65 per cent.) only where the soil was inoculated at the time of seeding. Symptoms appeared in 14 to 27 days when seedlings were inoculated at emergence and later stages. Steamed soil must be invaded a few weeks after sowing and the disease develops rapidly. Arasan (3·1 gm. per cu. ft.) [see above, p. 283] controlled the disease considerably when added to steam-sterilized soil before seeding.

BEHR (L. L.). **Krankheiten und Schädlinge der Gurke sowie deren Bekämpfung.** [Diseases and pests of the Cucumber and their control.]—*Ceres*, *1948*, 7–8, pp. 17–20, 6 figs., 1948. [Received February, 1950.]

The author briefly describes the symptoms, explains the etiology and modes of infection, and gives directions for the control of the following diseases affecting cucumbers in Germany: leaf blight (*Corynespora* [*Cercospora*] *melonis*) [*R.A.M.*, 21, p. 116], wilt (*Sclerotinia sclerotiorum* [ibid., 12, p. 417] and *Fusarium* spp.), cucumber mosaic virus [ibid., 13, p. 416], gummosis (*Cladosporium cucumerinum*) [ibid., 28, p. 436], anthracnose (*Colletotrichum lagenarium*), foliar browning caused by *Sporodesmium mucosum* var. *pluriseptatum* [ibid., 18, p. 652] (of rare occurrence, control measures unknown), mildew (*Erysiphe cichoracearum*) [ibid., 20, p. 509], downy mildew (*Plasmopara* [*Pseudoperonospora*] *cubensis*) [ibid., 7, p. 7], and angular leaf spot (*Pseudomonas lacrymans*) [ibid., 9, p. 10].

MARTIN (W. J.). **Mottle necrosis of Sweet Potatoes in Louisiana.**—*Plant Dis. Reptr*, 34, 3, p. 61, 1950. [Multilithed.]

In July, 1949, Porto Rican sweet potatoes growing on heavy, very wet soils were severely affected with mottle necrosis [*R.A.M.*, 14, p. 467] in the Leonville area, Louisiana, this being the first record of the disease in the State. Some fields showed up to 75 per cent. infection. The fungus isolated from diseased potatoes appears to differ from the fungi hitherto associated with the disease, *Pythium ultimum* and *P. scleroteichum* [loc. cit.]. About one half of the sweet potato tubers inoculated with the pathogen developed typical mottle necrosis, while in the others small circular spots appeared at the point of inoculation.

Cass Smith (W. P.) & Harvey (H. L.). **Powdery mildew or Oidium of Grapes.**—*J. Dep. Agric. W. Aust.*, Ser. 2, 26, 3, pp. 211–215, 4 figs., 1949.

In an experiment at Caversham, Western Australia, on susceptible vines of currant grapes, the ground sulphur dust currently used against powdery mildew (*Oidium tuckeri*) [*Uncinula necator*: *R.A.M.*, 14, p. 315; 29, p. 137] gave fair control of the disease with least damage. Colloidal sulphur alone, or mixed with either copper oxychloride or Bordeaux mixture, and zinc copper chromate all gave fair control. The yield per three vines for sulphur dust was 109·5 lb. compared with 95·5, 87, 85·5, 84·25, respectively, for the others and 40·75 for the untreated. The authors recommend that sulphur dust should be applied as a routine preventive measure at least three times, (1) when shoots are 4 in. long, (2) three weeks later, and (3) after fruit set, with further applications if humid or showery weather develops. All green parts of the vine should have a fine but complete cover of dust.

Bellod (M.). **La 'yesca' de la Vid en la región de Levante, su influencia en la longevidad de las cepas y experiencias sobre su tratamiento.** ['Esca' of the Vine in the Levante region, its influence on the longevity of stocks, and experiments on its treatment.]—*Bol. Pat. veg. Ent. agríc., Madr.*, 15, pp. 223–252, 11 figs., 1 diag., 1947. [Received January, 1950.]

'Esca' (apoplexy) of the vine (*Stereum hirsutum*=*S. necator* [*R.A.M.*, 17, p. 12 and next abstract] is stated to be an important source of damage in the Levante region of Spain, including the province of Murcia, where it is the principal cause of premature mortality or loss of limbs in a large number of stocks. Infection sets in when the vines reach the age of 15 to 20 years, and at 25 or 30 years their further cultivation frequently becomes uneconomic. Isolations yielded a white mycelium characteristic of the fungus, but no fructifications were obtained in culture.

A full description is given of experiments on the control of apoplexy by arsenical sprays which have been in progress since 1943. The results indicated that a solution of arsenious acid (0·5 per cent. arsenic trioxide), sodium arsenite, or sodium arsenate is equally effective with one of 1 or 1·5 per cent.; that a period of four years should elapse between one treatment and the next; and that the total outlay on the operation was less than 0·5 per cent. of the value of the harvest in the experimental vineyards.

Baldacci (E.). **Mal nero e falso mal nero della Vite in Italia.** ['Mal nero' and 'false mal nero' of the Vine in Italy.]—*Notiz. Malatt. Piante, 1949*, 5, pp. 2–5, 1 map, 1949. [Mimeographed.]

A map is given showing the localities in Italy and Sardinia from which 'mal nero' disease of the vine [*R.A.M.*, 29, p. 76] was reported from 1886 to 1935. Most of the records came from Upper Italy, especially Lombardy, Emilia, and Liguria, and this localization, together with the numerous references to 'root rot' in the cases recorded, would appear to indicate that the records from this region do not refer to the disease that Baccarini described, though the symptoms may have been similar. In Liguria, however, the reported symptoms more closely approximate to those of the Sicilian disease.

It appears that four conditions have sometimes been confused: 'mal nero', a disease of bacterial origin; a gummosis associated with pruning wounds and accompanied by parasitic attacks, the etiology of which is obscure; a 'false mal nero' due to Basidiomycetes and possibly other agents ('esca' [*Stereum necator* or *Fomes igniarius*] or 'apoplexy') [ibid., 28, p. 49 and preceding abstract]; and root rot due to *Rosellinia necatrix* [ibid., 27, p. 508]. True 'mal nero' has occurred near Etna, appears to be present in Calabria, and is or was present in Liguria ('mal dello spacco'); the three remaining conditions are more widely distributed in Italy, and may be general.

Rosella (E.). **Court-noué à virus et court-noué à Phylloxéra en Afrique du Nord.** [Court-noué due to a virus and court-noué due to *Phylloxera* in North Africa.] —*Vitic. Arboric., Paris*, 95, 11, pp. 320–323, 1949.

In this review of the possible causes of vine court-noué [*R.A.M.*, 28, p. 437; 29, p. 75] the author points out that insect transmission of the disease has not yet been proved [ibid., 26, p. 6; 28, p. 318], and that the type of intensification and spread of the disease in replanted vineyards does not indicate this mode of infection. Environmental conditions and soil in particular appear to be important factors, and it is possible that soils poor in organic matter or exhausted by continuous vine cultivation may be the cause of the trouble.

Gregory (P. H.) & Read (D. R.). **The spatial distribution of insect-borne plant-virus diseases.**—*Ann. appl. Biol.*, 36, 4, pp. 475–482, 1949.

An attempt is made to evaluate the form of the spatial distribution of two insect-borne virus diseases, namely, rugose mosaic [virus Y] and leaf roll, from point sources in potato crops, in order to obtain suitable measures of the effects of treatments employed in studying them. It is based on an analysis of data amassed at Rothamsted Experimental Station during 1943–6 [*R.A.M.*, 28, p. 302]. This and other published data on the spread of virus, bacterial, and fungal diseases by insects were fitted as well by the simple empirical expression $\log I = a + bx$ as by more complex expressions (I = number of infective punctures at a distance x from the source after a given time, and a and b are constants for any one set of field conditions). It is suggested that distances should always be given in metres in order to give comparable results from one investigation to another. The analysis of the data on rugose mosaic and leaf roll in different years showed that a and b varied independently.

In any further study of gradients shown by plant virus diseases attention should be paid to designing experiments to yield many more pairs of observations of the numbers of infections (or infective punctures) and distance from the source. The geometrical form of the source is important and allowance must be made for this in comparison between gradients. Multiple-infection transformations [ibid., 28, p. 186] are essential when more than 20 per cent. of plants are infected.

Kleczkowski (A.). **Interpreting relationships between the concentrations of plant viruses and numbers of local lesions.**—*J. gen. Microbiol.*, 4, 1, pp. 53–69, 10 graphs, 1950.

Inoculations of *Nicotiana glutinosa* half-leaves with tobacco mosaic virus and tomato bushy stunt virus, and of bean (*Phaseolus vulgaris* variety Prince) with tobacco necrosis virus (Rothamsted strain) were used at Rothamsted Experimental Station to test the effect of dilution on numbers of local lesions produced [*R.A.M.*, 28, p. 346]. A statistical and graphical analysis of the results prove them to be incompatible with the hypothesis that lesions are produced by the chance deposition of single virus particles on uniform susceptible areas of the leaf surface. Variations between different leaves or plants in their response to similar inoculations occur solely because of variations in the numbers of susceptible regions. The results were compatible, however, with the hypothesis that individual susceptible regions differ from one another in susceptibility so that different doses of virus are needed to produce a lesion (the variations being such that the logarithms of minimal effective doses are normally distributed). The second hypothesis is therefore more probably correct, but the first might be applied to the experimental results if various auxiliary assumptions, such as the existence of qualitatively different virus particles and susceptible regions are introduced. Conclusive evidence is likely to be obtained only through a new experimental approach.

Foster (W. R.) & MacSwan (I. C.). **Report of the Plant Pathology Branch.**—*Rep. B.C. Dep. Agric., 1949*, pp. W83–W88, 1950.

In this report [cf. *R.A.M.*, 28, p. 443] it is stated that during 1949 considerable damage was caused to winter wheat in the Vanderhoof area of British Columbia by a disease apparently resembling *Typhula* blight [*T.* spp.: cf. ibid., 21, p. 143; 25, p. 551; 29, p. 255]. Ninety per cent. of the plants on over 100 acres of one farm were affected and considerable numbers were also killed on a further 400 to 500 acres in about a 6-mile square. Lucerne bacterial wilt [*Corynebacterium insidiosum*: ibid., 28, pp. 577, 621; 29, p. 80] was found for the first time in the Creston area.

A third inspection of cherry orchards in the Okanagan failed to reveal the presence of little cherry [ibid., 28, p. 222; 29, p. 313]. The symptoms of the disease, which occurs in all the fruit-growing districts of the Kootenays, seem to vary in different localities and orchards. This disease appears to be distinct from small bitter cherry [ibid., 27, p. 354], which occurs in the Southern Okanagan, always in proximity to peaches affected by western X-disease [ibid., 28, p. 222]. No western X-disease in peaches has been found in the Kootenay, though there have been cherry plantings with little cherry in the vicinity for 15 years. Two Bing and two Lambert cherry trees with small bitter disease were found, bringing the total number of affected trees up to 19, 16 Bing and three Lambert. The disease appears to occur at Osoyoos and Oliver only in close proximity to peach trees affected by western X-disease.

Strawberry red stele [*Phytophthora fragariae*: ibid., 28, p. 444] still causes considerable damage in the Fraser Valley and on Vancouver Island. The Pitt variety, a chance seedling found in the Fraser Valley, appears to be more resistant than Temple, Pathfinder, or Aberdeen [cf. ibid., 27, p. 375; 28, p. 528], but the fruit is of poor quality. The value of the plants sold under the certification scheme [ibid., 27, p. 354] in 1949 was $59,023; 263,500 were despatched to the United States.

Black knot [*Dibotryon morbosum*: ibid., 29, p. 81] is present in serious proportions in many plum and some prune plantings. The most important control measure is to remove infected material to at least four inches below the knot, commencing before 1st March. Supplementary spraying with lime-sulphur (1 in 10) or Bordeaux mixture (4–6–40) should be effected just before bud-burst.

Coryneum blight [*Clasterosporium carpophilum*: ibid., 28, pp. 405, 462; 29, pp. 262, 313] was general on the leaves of peaches and cherries throughout the lower Mainland and caused severe spotting on some of the fruits of several peach orchards, mainly in the Chilliwack area.

Potatoes remained virtually free from bacterial ring rot [*Corynebacterium sepedonicum*: ibid., 29, pp. 80, 117, 168]. No rejection of potatoes entered for certification was due to ring rot. One affected potato was found during a field inspection in an area where a trace of the disease had been present the year before. A trace was also found in a car load of Irish Cobbler potatoes shipped by one grower from Kamloops to the coast, the source of infection being 1947 certified seed from Prince Edward Island. The directive issued in 1948 [ibid., 28, p. 443] has functioned so well that it is to be continued for a further year.

Potato blight [*Phytophthora infestans*: loc. cit.] was much less widespread and severe than in 1948; only in the last week of July was a broadcast warning to growers considered necessary. The value of spraying carefully with copper fungicides was clearly demonstrated on Lulu Island, where an acre of unsprayed potatoes in the midst of a potato-growing area became severely affected in the haulms and tubers.

About 80 per cent. of cauliflowers grown for seed production in soil of pH 4·95 showed whiptail [ibid., 29, p. 282] more than two months after setting out. Sodium molybdate (4 lb. per acre) caused many plants to make a striking recovery, though too late to produce a seed crop.

Progress Report, 1936–1946. Dominion Experimental Station, Lennoxville, Que.— 89 pp., 18 figs., 1 graph, 1950.

This report from Quebec contains the following items of phytopathological interest. Peatland barley [*R.A.M.*, 26, p. 388], resistant to stem rust [*Puccinia graminis*], is being propagated for general distribution. Wilhelmsburger swede, possessing resistance to club root [*Plasmodiophora brassicae*: ibid., 29, pp. 142, 275], has proved a good yielder in tests over the period under review. Dollard and Ottawa double-cut clovers are hardy, resistant to disease [unspecified], and very good yielders.

Report East African Agriculture and Forestry Research Organisation (Incorporating the East African Agricultural Research Institute, Amani), 1948. 37 pp., Nairobi, [? 1949].

In the plant pathology section of this report (pp. 14–15) [cf. *R.A.M.*, 27, p. 63] R. F. W. Nichols states that breeding and testing of cassava hybrid clones has continued. Three of the 240 clones undergoing trials at Ngomeni are resistant to mosaic and brown streak [loc. cit.], one being apparently immune. It is suggested that it is desirable to discontinue temporarily the production of new clones until those on hand have been tested. By 1951 there should be several clones with high resistance to mosaic and brown streak and of good agronomic quality. High disease resistance has been secured in the second back-cross generations; if this can be maintained to the point where the desired agronomic qualities are restored in succeeding generations, the two virus diseases should cease to be a limiting factor in cassava production.

H. H. Storey reports that research on virus diseases of groundnuts, especially the rosette disease [ibid., 28, pp. 271, 560] is being planned with the Scientific Section of the Overseas Food Corporation, Kongwa, Tanganyika. The East African Agriculture and Forestry Research Organisation will undertake, among others, studies on the transmission of the virus.

I. A. Black (p. 21) reports that a nutritional survey of sisal diseases in the Tanga and Southern Provinces revealed that banding disease [ibid., 10, p. 32] is associated with potassium deficiency. Chlorotic leaves were associated with a low nitrogen content. Several factors are apparently responsible for curling, purpling, and withering of leaf tips, and phosphorus deficiency [ibid., 14, p. 237; cf. 25, p. 100] is probably one of them. Chlorotic mottling of leaves was observed in plants growing in acid soils, and the leaves always had an abnormally low calcium content. Excess manganese may play a part in severe cases of the disease. Bole rot is probably caused by a fungus, but the symptoms appeared to be influenced by the calcium status of the plant.

The main object of the Clove Research Scheme, Zanzibar (pp. 34–36), started in November, 1947, is to investigate the sudden death disease [ibid., 29, p. 277; and below, p. 382]. The testing of a pathogenic hypothesis presented many difficulties, as grafting mostly failed. The only successful grafts (1·6 per cent.) have been those where the union has been kept covered with damp moss. A promising line for transmission work has been opened by the development of leaf grafts (17 per cent.), where the leaf petiole is fixed underneath the bark by means of a spring clip, and experiments are in progress in which leaves from suspected trees are grafted to healthy seedlings. Transfer experiments with scale insects (*Saissetia* sp.) [loc. cit.] have been started. Physiological studies of healthy and diseased clove trees carried out by F. J. Nutman have shown that onset of the disease is associated with a marked depression in the rate of photosynthesis and a moderate reduction in transpiration. Anatomical studies by F[rances] M. Sheffield revealed that the clove tree has certain abnormalities, which are usually associated with a pathological condition, the only

difference between healthy and diseased trees being that in the latter these abnormalities are accentuated and tend to occur earlier.

Annual Report of the Department of Agriculture, Dominica, 1947.—33 pp., [? 1950.]

The following notes on plant diseases occur on p. 8 of this report [cf. *R.A.M.*, 27, p. 464]. Incidence of tobacco mosaic [ibid., 27, p. 464] during the year was high. Panama disease (*Fusarium* [*oxysporum* var.] *cubense*) [ibid., 26, p. 146] was widespread, so severely restricting the area under Gros Michel bananas that the industry based on this variety is no longer economic. Sigatoka disease (*Cercospora musae*) [*Mycosphaerella musicola*: ibid., 24, p. 7; cf. 29, p. 12] was present in most banana plantations.

Orian (G.). **Division of Plant Pathology.**—*Rep. Dep. Agric. Mauritius, 1948*, pp. 69–74, 1949.

In this report [cf. *R.A.M.*, 28, p. 325] it is stated that in August, 1948, ten tobacco plants growing in the Rivière du Rempart district of Mauritius showed symptoms identified by Dr. [J. C. F.] Hopkins from affected material as apparently typical of leaf curl [ibid., 27, p. 544; 28, p. 491; 29, p. 61]. The white fly, *Bemisia* sp., is reported to be present.

Victoria Bunch groundnuts grown from seed imported from Uganda were so severely affected by bacterial wilt (*Xanthomonas solanacearum*) [ibid., 27, p. 172; 29, p. 143] that it was decided, following a survey, that this variety does not constitute a profitable crop under Mauritius conditions. The variety known locally as 'Cabri', which is highly resistant, is to be considered provisionally as the standard variety in the island. Cabri, however, shows some susceptibility to stem rot (*Sclerotium rolfsii*) [ibid., 28, pp. 53, 641], mostly when approaching maturity.

The undetermined root parasite thought to be the primary cause of wilt of filao (*Casuarina equisetifolia*) is probably *X. solanacearum*. The fungus (*Trichosporium vesiculosum*) [ibid., 7, p. 416; 9, p. 507; 27, p. 555] is probably a secondary invader.

A wilt of royal palms (*Roystonea regia*) was notified in December, 1947. The chief symptoms were the death of the crown leaves, apparently proceeding inwards, and the collapse of the stem tissues from the base upwards. The attack on the internal tissues caused the stem to yield readily to pressure on the outside, a feature distinguishing the disease from that due to *X. vasculorum* [ibid., 28, p. 325]. Mechanical weakening of the stem caused the upper part to fall over, though remaining connected with the rest of the stem; when this occurred, the heart leaf was still green and the first opened leaf was sometimes still partially so. In the ground tissue of the stem a soft rot extended from the base up, leaving the vascular bundles a mass of loosened fibres. A bacterium was cultured from apparently newly affected tissues, and dilution cultures of a suspension of small black masses from rotting tissues at the base of the stem produced fungal growths with an abundant, white, upright, cottony mycelium.

República Argentina. Almanaque del Ministerio de Agricultura de la Nación, Ãno XXIV, 1949. [Argentine Republic. Almanac of the National Ministry of Agriculture. Year XXIV, 1949.]—*Publ. Minist. Agric., B. Aires*, 447 pp., 1949.

Included in this useful publication dealing with various aspects of agriculture in Argentina are contributions by Blanca A. Traversi (pp. 255–256, 1 fig.) on the *Dahlia* disease caused by the tomato black pest [tomato spotted wilt] virus [*R.A.M.*, 26, p. 84]; on organic fungicidal compounds by Noemi G. Abiusso on pp. 357–358 [ibid., 27, p. 434]; and brief summaries of the available information on wheat bunt (*Tilletia tritici* and *T. levis*) [*T. caries* and *T. foetida*: ibid., 27, p. 560],

(between pp. 192 and 193), flax wilt (*Fusarium lini*) [ibid., 27, p. 412] (between pp. 224 and 225), and rice blast (*Piricularia oryzae*) [ibid., 23, pp. 77, 356] (between pp. 352 and 353), each illustrated by a coloured plate.

Reunión de comunicaciones con motivo de cumplirse el V° anniversario de la iniciación de las actividades del Instituto del Fitotecnia. [Symposium of communications on the occasion of the completion of the fifth anniversary of the initiation of the activities of the Institute of Phytotechnics.]—45 pp., República Argentina, Ministerio de Agricultura de la Nación, 1949. [Mimeoprinted.]

The following are among the contributions to this symposium of papers presented at the fifth anniversary meeting of the Institute of Phytotechnics, Castelar, Argentina, in August, 1949. A. Castronovo (pp. 14–15), seeking for sources of resistance to the virulent physiologic races of potato blight (*Phytophthora infestans*) endemic in Argentina [*R.A.M.*, 27, p. 580], found the most promising material among the species *Solanum 'aya-papa'*, *S. cardiophyllum*, *S. demissum*, *S. semidemissum*, *S. verrucosum*, and the selections 834 *c* (29), 914 *a* (12), S.96–28, C.Z.K.–7, C.H.I.–2, and C.R.E.–17.

A. Rosenblit (p. 6), studying a population of 30 monospore isolates of *Ascochyta imperfecta* [ibid., 21, p. 528 *et passim*] from La Plata, found evidence of well-marked genetic constancy in cultural characters, persisting in the second and third series of subcultures.

In experiments by H. P. Cenoz (p. 35) to determine the reactions of a large number of native and foreign wheat varieties and selections to loose smut (*Ustilago tritici*), which is widely distributed and destructive throughout the cereal belt [ibid., 21, pp. 184, 518], the indigenous Sinvalocho M.A., Reliance, Klein Cometa, 38 M.A., Klein Aniversario, and the selection Cheg. 89×5152 of the Guatraché Experiment Station proved very resistant, and Buck Quequén, Kanhard sel. Buck, Kanred sel. Klein, Klein Exito, Klein Orgullo, Klein Otto Wulff, Klein 157, and Sola 50 sel. Buck were resistant. Highly resistant foreign varieties included Apex, Axminster, Chino 166, Chino 466 Chul, Dixon, Fultz, Heines Kolben, Kendee, Kenya K–117–A, Ld 305, Newthatch, Riosulino, and Warigo. With very few exceptions, the varieties of *Triticum durum*, *T. monococcum*, *T. polonicum*, *T. macha*, and *T. timopheevi* are almost completely resistant. *T. turgidum* yielded only one resistant variety, Chaucho Ovalle, originating in Chile, while *T. compactum* and *T. sphaerococcum* were susceptible. Resistance in Sinvalocho M.A. was found to be conferred by one dominant factor pair, which is also possessed by the male parent, 38 M.A., and was originally inherited from Chino 466.

In 1945 A. P. Cercos (p. 9) undertook an investigation of physiologic specialization in wheat bunt (*Tilletia tritici* and *T. levis*) [*T. caries* and *T. foetida*], involving the inoculation of some 500 varieties by dusting the seed-grain with chlamydospores. In general a high degree of resistance was shown by varieties belonging to the tetraploid species of *Triticum*. Resistant indigenous varieties of *T. aestivum* included Kanhard sel. Buck, Klein 239q 140, Klein Piramido, and Klein Orgullo, and among the foreign ones with a similar response were Thatcher, Marquillo×Oro, Marquis, Regent, and Renown. Preliminary tests, using Buck Claromecó, Heines Kolben×38 M.A., and Klein Orgullo as differential varieties, indicated the presence in the country of two physiologic races, and possibly of a further five, taking the two species of *Tilletia* in conjunction.

In trials conducted by J. A. Sarasola and Maria D. Campi de Sarasola (p. 3) in a search for sources of resistance in wheat to *Septoria tritici* [ibid., 27, p. 413], those varieties on which the fungus had formed no pycnidia by the 25th day, or on a further inspection shortly afterwards, were deemed to be resistant, viz., Bordeaux (D.I.V. 307), Candeal La Previsión (D.I.V. 4004), Currel (D.I.V. 1616), Chino 166×Lin Calel (D.I.V. 156), Chino 166×Lin Calel (D.I.V. 157), Leap's Prolific

(D.I.V. 2345), Leap's sel. 1036 (D.I.V. 2348), Leap's sel. 12.185 (D.I.V. 2109), Ld 276 (D.I.V. 2862), O.A.C. (D.I.V. 1646), and Oned Renati (D.I.V. 428).

E. A. Favret (p. 2), in further studies on the inheritance of resistance to physiologic races Arg. 1 and 2 of *Erysiphe graminis hordei* in barley [ibid., 26, p. 447; 28, p. 169], demonstrated the following genotypic composition: Monte Cristo and Engledow India (immune from both races) carry the factor Ml^m, West China and Cebada Negra (immune from Arg. 1) Ml^c, and Nigrate (resistant to both races) ml^n; Trebi is susceptible.

J. H. Frecha (p. 42) investigated the reactions of a large number of barley varieties to net blotch (*Helminthosporium teres*), the most widespread disease of the crop in Argentina [ibid., 27, p. 67]. A high degree of resistance was shown by Rojo (D.I.V. 2376), Cebada da Hoya Epuyen (D.I.V. 2288), Abyssinian C.I. 1243 (D.I.V. 2201), and *Hordeum spontaneum* (D.I.V. 2418), and a moderate one by Alpha (D.I.V. 1324), Minnesota 565s D.1340 (D.I.V. 2190), and Oakley sel. 28·312 (D.I.V. 516). Statements in the literature regarding the hosts of *H. teres* are contradictory. In the writer's experiments the fungus formed necrotic lesions, without the characteristic aspect of net blotch, on wheat, oats, rye, rice, maize, sorghum, and species of *Lolium*, *Hordeum*, *Elymus*, *Bromus*, *Dactylis*, *Festuca*, *Poa*, *Cenchrus*, and *Echinochloa*. Indications of the existence in the country of physiologic races of the pathogen were obtained.

Confirmation having been secured of the suspected presence of *Xanthomonas translucens* var. *cerealis* on barley [ibid., 25, p. 553] in Argentina, J. L. Tessi (p. 5) carried out varietal reaction experiments which demonstrated the resistance of Carrée de Printemps Escourgeons I.F. 3158, Fong Tien, Kindred C.I. 6909, O.A.C. 21, and Wisconsin Winter × Glabron 2073.

In 1942 J. Vallega (p. 40) carried out a study on F_3 material of a cross between the oats varieties Santa Fé and Klein Mar (a descendant of Victoria) in relation to the physiologic races of *Puccinia coronata* occurring in Argentina [ibid., 23, p. 258]. The results denoted that the resistance of Santa Fé No. 1 to races 1, 55, and 56 depends on a single genetic factor, and that in Klein Mar the same response to races 1 and 45 is conditioned by independent factors. These observations were corroborated by the analysis of a cross between Santa Fé No. 1 and Tama, a descendant of Richland. It was further shown that a single factor is responsible for the resistance of Tama to races 3 and 7 of *P. graminis avenae* [ibid., 23, p. 257].

J. Vallega and E. J. Martinez (p. 16) used Straib's standard assortment of oats varieties [ibid., 17, p. 233] in their studies on the Argentine physiologic races of *P. coronata*, which proved to be distinct from any of the 144 recorded by that author for Europe. Of his differential varieties, only Victoria and Bond (also used by Murphy [loc. cit.]) were of general use in the separation of the races endemic in Argentina, but Straib's Flughafer is helpful as an aid to the detection of race 1. In addition, Santa Fé No. 1 is a useful adjunct for the differentiation of race 45. There is thought to be no doubt that the latter is distinct from the North American race 45 [ibid., 23, p. 330], and this supposition is confirmed by the susceptibility of Santa Fé No. 1 and Mutica Ukrainia to the Argentine race, these varieties being resistant to the North American [ibid., 25, p. 543].

All the oats varieties which were susceptible to *H.* [*Pyrenophora*] *avenae* [ibid., 25, p. 267] in J. A. Sarasola's experiments (p. 1) were descendants of Victoria. Since this variety and its offspring have hitherto been the only sources of resistance in Argentina to race 45 of crown rust, a search for material carrying other factors of the same nature will be essential.

J. L. Tessi (p. 39) reports the first observation in the Republic of *Pseudomonas coronafaciens* on oats [ibid., 23, p. 92; 25, p. 543]. The pathogen occurs in areas of intensive cultivation, but up to the present it appears to have caused little damage. Positive results were obtained in inoculation experiments on barley, rye, wheat,

Bromus catharticus, *Hordeum bulbosum*, *H. stenostachys*, *Lolium multiflorum*, *L. perenne*, and *Festuca elatior*. The most resistant varieties of oats were La Estanzuela F_2 au 12 and D.L.M. 3, followed by La Previsión 13 and Letoria C.I. 3392, while a satisfactory response was also shown by Quincy Red (Quincy 1) C.I. 4077, Lee (winter oat) CI 2042, and Buck sel. 212.

E. A. Favret and A. Rosenblit (pp. 41–42) found that *Agrobacterium* [*Bacterium*] *tumefaciens* exerted a mitogenetic action on malt extract agar cultures of *Saccharomyces cerevisiae* in exposures of ten minutes at a distance of 10 mm., while a corresponding effect was produced by *Ustilago maydis* [ibid., 25, p. 555] in 15 minutes at a maximum distance of 10 mm. The treatment should be given while the colonies are traversing the lag phase of growth.

Elisa Hirschhorn's (p. 26) studies on the life-cycle of the sugar-cane smut fungus (*U. scitaminea*) [ibid., 25, p. 11] showed that the infection hyphae are dikaryophasic, each nucleus proceeding from a different cell of the promycelium. These nuclei divide repeatedly and fuse in pairs before and during the maturation of the chlamydospores. In *U. scitaminea* karyogamy occurs earlier than in other smuts. The uninucleate chlamydospores develop about 90 days after inoculation in the terminal and intercalary cells of the thick, long, contorted hyphae. Most of the buds on the smutted shoots are infected. The mycelium perennates in the host, so that the sole effective method of control consists in the development of resistant varieties.

The same author (p. 36) investigated the capacity of *U. scitaminea* for growth on a potato dextrose agar medium rendered unsuitable by the addition of varying concentrations of sodium arsenate. Of 110 monosporidial isolates tested, only four developed normally in the presence of high concentrations of the chemical; the remainder did not acquire the capacity until several generations had been exposed to a series of increasing dosages. In the case of very low concentrations, some isolates showed immediate signs of growth, while that of others was delayed by 8 to 10 or up to more than 30 days.

J. Vallega and E. A. Favret (p. 24) report, in connexion with their studies on the genetics of resistance in flax to *Melampsora lini* [ibid., 27, p. 412], that field observations during the exceptionally severe epiphytotics of the rust in 1936 and 1937 on the F_1, F_2, and F_3 of crosses between Bombay and Perg. 6899 demonstrated the dependence of immunity on two factors of complementary effect [cf. ibid., 26, p. 489]. The same two factors were shown in further experiments on the same cross and Bombay × Klein 11 to confer immunity from races 19, 22, 40, and 42 of *M. lini*. A single factor was found to be responsible for the resistance of J.W.S. to races 19 and 22, and another single factor for that of Ottawa to 19 and 40. The Bombay factors also operate in the Indian Type 29 and Punjab varieties and the T. Tammes factor in J.W.S.

Mackie (T. J.) & McCartney (J. E.). **Handbook of practical bacteriology—a guide to bacteriological laboratory work. Eighth Edition.**—viii + 652 pp., 4 figs., 17 diags., Edinburgh, E. & S. Livingstone, Ltd., 1950. 25*s*.

In the second reprint of this edition the text has been completely revised in the light of recent developments in bacteriological knowledge and technique. Subject-matter which formed an appendix to the sixth and seventh editions has been incorporated in the appropriate chapters, and a new appendix brings the subject-matter as up to date as possible.

There is much to interest plant pathologists in the Introduction, comprising chapters I and II entitled The general biology of micro-organisms, and Immunity in relation to practical bacteriology, and in Part II, which is concerned with bacteriological technique. Chapter III is on the use of the microscope in bacteriology; IV Staining methods; V and VI The cultivation of micro-organisms; VIII

Immunological and serological methods as applied to bacteriology, and IX Bacteriological examination of air, water, milk, etc.; testing of antiseptics, etc.; collection and forwarding of specimens for bacteriological examination. In Part III, dealing with pathogenic and commensal micro-organisms (including filterable viruses) and bacteriological diagnosis, chapter XXII is devoted to filterable viruses and bacteriophage, and chapter XXIII to fungi pathogenic to animals and human beings.

Beck (E. G.). **The effect of wounding and heteroauxin on the development of crown gall on Impatiens balsamina.**—Abs. in *Amer. J. Bot.*, 36, 10, pp. 793–794, 1949.

Plants of *Impatiens balsamina* at the University of Georgia, Athens, were topped and the cut surfaces inoculated with the crown gall organism *Phytomonas* [*Bacterium*] *tumefaciens* [*R.A.M.*, 16, p. 442 and next abstract]. Galls formed in the cortex near the point of inoculation. When the inoculated surfaces were also treated with lanolin containing 3 per cent. heteroauxin the galls formed were two to three times larger, with more meristematic groups, larger cells, and greater lignification of tracheal- and vessel-like cells.

De Ropp (R. S.). **The comparative growth promoting action of 3-indole acetic acid and Agrobacterium tumefaciens.**—Abs. in *Amer. J. Bot.*, 36, 10, pp. 822–823, 1949.

The author reports from work at the New York Botanical Gardens that tumours are formed on storage tissue of carrot and Jerusalem artichoke [*Helianthus tuberosus*] by *Agrobacterium* [*Bacterium*] *tumefaciens* [*R.A.M.*, 29, p. 147 and preceding and next abstracts], and most of the tumour tissue will grow *in vitro* with solutions of sugar and mineral salts only. When treated with indole-3-acetic acid [ibid., 26, pp. 238, 289] the uninoculated plant tissues produced only occasional small spherical outgrowths.

Levine (M.). **Plant-tissue culture technique from the mycological viewpoint.**—*Trans. N.Y. Acad. Sci.*, Ser. II, 12, 2, pp. 63–66, 1949.

The results of experiments at the Montefiore Hospital, New York, showed that meristematic tissue of higher plants, e.g., carrot, tobacco, sunflower, Jerusalem artichoke [*Helianthus tuberosus*], parsnip, salsify, and kohlrabi, can be grown on a pure synthetic medium to form tissue cultures with an unlimited capacity for proliferation. Bacterial contaminants probably gain access to the healthy plant tissues [*R.A.M.*, 28, p. 273] through small wounds or lenticels, and trouble from this source may be reduced by careful selection of organs, surface sterility, removal of surface epidermis, and use of inner tissue. Division and transfer of the tissue culture expose it to contamination by moulds, predominantly *Penicillium* sp.

Tissue cultures of carrot tap-root and stem segments of *Nicotiana langsdorffii* and *N. affinis* yielded completely differentiated plantlets. Cytological studies of the tissue masses and some carrot plantlets, following growth on the chemical carcinogens, 1, 2, 5, 6-dibenzanthracene, 3, 4-benzpyrene, and 20-methylcholanthrene, revealed structures not unlike those induced by crown gall (*Phytomonas* [*Bacterium*] *tumefaciens*) [cf. ibid., 27, p. 329].

Ciferri (R.) & Ciferri (Fiorela). **Reconocimiento de la explotación cacaotera de los valles de riego del sector central (Estado Aragua).** [Survey of the Cacao culture in the irrigated valleys of the central sector (State of Aragua).] –153 pp., 3 diags., 19 graphs, Estados Unidos de Venezuela, Ministerio de Agricultura y Cria, Dirección de Agricultura, 1950. [Mimeographed.]

Some observations on the diseases of cacao in the irrigated plantations of Aragua, Venezuela [cf. *R.A.M.*, 29, p. 147 and next abstract], are included in this fully documented publication (pp. 128–131). *Phytophthora palmivora* is chiefly important

as the agent of black rot of the pods [ibid., 21, p. 324; 28, p. 386], which is a source of heavy damage, especially during the winter. Brown rot of the pods is caused by *Diplodia* [*Botryodiplodia*] *theobromae* [ibid., 21, p. 324], which follows *P. palmivora* or enters through injuries of animal origin. *B. theobromae* is also associated with die-back, which is prevalent in old, neglected plantings and to a lesser extent in those without sufficient shade or situated too close to the sea. It is regularly accompanied by leaf scorch, a complex functional disturbance originating in an unbalanced water supply and potash deficiency. Species of *Phyllosticta* may be found in the shrivelled areas, but the fundamental cause of the disease is believed to be physiological. The pathogenicity of *B. theobromae* is also considered to be doubtful.

An obscure disease known as 'black heart' affects only a few beans (sometimes not more than one) in the pods of native cacao, or of superior foreign types approximating to native in their characteristics. The most conspicuous symptom is the blackening and decay of a limited area in the centre of the cotyledons.

Ciferri (R.) & Ciferri (Fiorela). **Reconocimiento de la explotación cacaotera de los Andes venezolanos.** [Survey of Cacao culture of the Venezuelan Andes.]—*Suppl. Atti Ist. bot. Univ. Pavia* (Edizione mimeografata), Ser. 5, G, 38 pp., 1950.

The cacao diseases observed in plantations of the Venezuelan Andes are mentioned on pp. 31–32 of this report. In addition to those already included in the preceding abstract, mention is made of the probable occurrence of *Monilia roreri*, which is known in Maracaibo and in the part of Colombia [*R.A.M.*, 24, p. 272] contiguous with Venezuela, though the authors did not obtain satisfactory specimens.

Besides *Phyllosticta*, species of *Pestalotia* are present on scorched leaves.

Boosalis (M. G.). **A partial-vacuum technique for inoculating seedlings with bacteria and fungi.**—Abs. in *Phytopathology*, 40, 1, pp. 2–3, 1950.

The following rapid and effective method of inoculation with *Xanthomonas translucens* f.sp. [var.] *undulosum* [*R.A.M.*, 25, p. 337] has been applied to over 1,000 seedlings of wheat, oats, barley, rye, and *Bromus inermis*. Strips of newspaper or blotting paper, 6 by 2 in., were folded lengthwise and 30 seeds placed in the fold and covered with vermiculite. Blocks of seven to ten seeded strips were held together by rubber bands. Germinating seeds were kept at 20° to 25° C. and watered daily with tap water. When the seedlings reached a height of 3 to 5 in. seven blocks were submerged in an aqueous bacterial suspension in a pressure cooker. Evacuation to approximately 0·008 mm. mercury for one to five minutes was effected by means of a Cenco Hyvac pump. The inoculated seedlings were then grown in soil or in vermiculite supplemented with nutrient solution. This technique usually produced 100 per cent. infection within about five days. It is also applicable, if necessary with modifications, to certain smuts.

McFadden (E. S.). **New sources of resistance to stem rust and leaf rust in foreign varieties of common Wheat.**—*Circ. U.S. Dep. Agric.* 814, 16 pp., 1949. [Received April, 1950.]

In field test plots from 1937 to 1940 at College Station, and in 1940 at Angleton and Weslaco, Texas, of the 1,639 common foreign wheat varieties and strains tested by artificial inoculation 43 gave lower percentage readings of stem rust (*Puccinia graminis*) [*R.A.M.*, 28, p. 568] than the standard resistant variety Kota. Thirteen of the 43 were also highly resistant to leaf [brown] rust (*P. triticina*) [ibid., 29, p. 91]. The following developed less than 0·5 per cent. average stem rust infection

over the period 1938–40: Hope (C.I. 8178) and Iumillo (C.I. 1736) were immune, Kenya (C9968 and C9906), Kenya × Gular (4913), Kenya (C10854, C10856, C10863, C9724), Kenya × Gular (5935), and Vernal emmer (C.I. 2975) developed 0·2 per cent. infection, and Kenya crossbred (C6040), Argentine K40 (C9658), and Uruguay 392 (C10837) averaged 0·1 to 0·4 per cent. compared with Kota 46 per cent. and the susceptible Marquis 87 per cent. Races 24, 38, and 56 of *P. graminis* were isolated in 1937, races 1, 17, 49, and 50 in 1938, 46 and 56 in 1939, and 15, 17, 38, and 56 in 1940.

The varieties most resistant to brown rust (average infection percentages for the same period) were: Fronteira (C.I. 12019), Frondoso (C.I. 120078), and Hope 0; M12–32, Renacimiento (C.I. 12002), and Surpresa 0·2; and Iumillo and Vencedor (SF 12708) 0·3. All except the last-named were resistant to stem rust. In 1939, races 9, 13, 41, 50, and 105 of *P. triticina* were identified and in 1940, races 3, 9, 11, 13, 20, 28, 31, 44, 54, 58, and 105.

The Kenya varieties and most of their derivatives, although very susceptible to brown rust, are outstanding for their early resistance to stem rust and for coming into head while day length is still short. These characteristics should make them valuable breeding material for tropical and subtropical countries.

A table giving some characteristics of the 43 rust-resistant wheats is presented for the guidance of breeders in selecting parental material.

Miège (E.). **Les principales espèces et variétés de Blé cultivées en Afrique du Nord.** [The chief species and varieties of Wheat cultivated in North Africa.]—*Rev. Bot. appl.*, 30, 327–328, pp. 16–38, 1950.

Wheat varieties introduced into Tunisia include Akreboze 635 from Turkey, resistant to black rust [*Puccinia graminis*: *R.A.M.*, 26, p. 444], Kokini 647 from Cyprus, and Palestine 778, resistant to rusts [*Puccinia* spp.]. These varieties are at present being widely used only in breeding work. Among intraspecific hybrids Sindyouk × Mahmoudi 870, now widely grown, shows improved resistance to rust. Chili is resistant to lodging and appears to be little affected by rusts. Kasserine is a local Mahmoudi wheat, preliminary trials with which have given good results; it shows resistance to rust. M'rari 549 from Palestine, highly resistant to black rust, was found to be very susceptible to yellow rust [*P. glumarum*]. Mahmoudi 552 [loc. cit.] showed excellent resistance to black rust and good resistance to lodging. Rossarda from Italy is moderately resistant to black rust. The Greek varieties Argos, Eretria, and Mauragani are reputed to be resistant to black rust.

In Algeria the Bidis varieties and Oued Zenati 368 are resistant to black rust.

Fischer (G. W.). **Spontaneous occurrence of Tilletia caries (T. tritici) on seven new hosts.**—Abs. in *Phytopathology*, 40, 1, p. 9, 1950.

Between 1945 and 1949 a species of *Tilletia* apparently identical with *T. caries* was collected in some of the western States of the American Union on grasses not hitherto reported as spontaneous hosts of bunt, namely *Agropyron subsecundum* and *A. trachycaulum* (Idaho), *Bromus ciliatus* (Wyoming), *B. marginatus* (Idaho and Montana), *B. rigidus* (Washington), *B. tectorum* (Colorado, Idaho, Montana, Utah, and Washington), and *Poa reflexa* (Wyoming). Considerable variation in spore morphology was observed among the collections, as already demonstrated in studies of the 15 physiologic races of the pathogen on wheat. Superficially the bunt on *B. tectorum*, the most widely distributed of the grass hosts, resembles *Ustilago bullata*, almost ubiquitous in the west [*R.A.M.*, 28, pp. 240, 511], and this is probably why the disease has been overlooked for many years. *A. subsecundum* and *A. trachycaulum* had previously been reported as hosts of *T. caries*, but only by inoculation with spores from naturally infected *A. cristatum* [ibid., 16, p. 90].

Borzini (G.). **Risultati di esperienze di lotta contro la 'carie' del Frumento (Tilletia spp.) eseguite a Certosa (Pavia) nel 1947-48.** [Results of experiments on the control of Wheat bunt (*Tilletia* spp.) carried out at Certosa (Pavia) during 1947–48.]—*Ann. Sper. agr.*, N.S., 3, 5, pp. 1271–1276, 1949. [English summary.]

In the 1947–8 experiments carried out at Certosa, Italy, the percentages of bunt (*Tilletia* spp.) [*T. caries* and *T. foetida*: *R.A.M.*, 29, pp. 91, 92 and next abstract] on Impeto wheat after seed treatment with ravit V 1 and V 4 (copper oxychloride), copper sandoz, agrosan, sesan [loc. cit.], a mixture with a high content of chlorinated naphthoquinone, and one with high chlorinated benzoquinone were 1·9, 9·4, 3·4, 1·1, 1·4, 1·8, and 3·3. The untreated had 100 per cent. bunt.

Borzini (G.). **Esperienze di lotta contro la 'carie' del Frumento (Tilletia spp.) effettuate a Certosa (Pavia) nel 1948-49.** [Experiments on the control of Wheat bunt (*Tilletia* spp.) carried out at Certosa (Pavia) during 1948–49.]—*Notiz. Malatt. Piante, 1949*, 6, pp. 2–14, 1 graph, 1949. [Mimeographed.]

In experiments carried out at Certosa, Italy, in 1948–9, machine-threshed Impeto wheat grain artificially contaminated with 0·2 per cent. by weight of the chlamydospores of *Tilletia* spp. [*T. caries* and *T. foetida*: see preceding abstract] was treated with 0·3 per cent. by weight of 25 different cupric, organo-mercury, and non-metallic dusts [cf. *R.A.M.*, 27, p. 484]. The results obtained [which are tabulated and fully discussed] showed that excellent control of bunt was given by the various cupric salts used. The organic copper compounds were in some instances more effective than copper oxychloride plus lime (Caffaro A or B), the activity of which varied appreciably with slight differences in manufacture or with the physical characters of the diluent, or with the addition of small proportions of organic fungicides. Some organic mercury compounds (or molecular complexes) were highly effective and at least as efficient as the most active copper fungicides tested. Non-metallic organic compounds, such as Sesan Caffaro (naptho- and chlorated benzoquinones), and materials with an hexachlorobenzene [ibid., 29, p. 148] base (ravit), and organic zinc compounds (dipentachlorophenate) were also very active. S.P. 2, S.P. 4 (chlorated benzoquinone), sesan, marini bettolo B (a mercuric chloride, salicylic aldehyde complex), ravit, prosat M.184a (organic fungicide plus copper-salt at 25 per cent.), M.P.D.E. (copper dipentachlorophenate), copper oxychloride, cuprous plus cupric oxides, P.C.P.S. 48 (Caffaro powder plus organic fungicide) gave excellent control (1 to 10 per cent. bunted spikes) without apparently exerting any injurious effect on germination or early growth of the plants under field conditions [ibid., 29, p. 17]. Two of the most active, which were also non-injurious, S.P. 2 Caffaro (chlorated naphthoquinone) and Sesan Caffaro, were outstanding, with 2·3 to 2·5 and 3·9 to 6·4 per cent. diseased ears respectively, compared with 100 per cent. on the untreated. They were safe in the field or under severe, controlled conditions, even when the seed used showed lesions due to mechanical threshing, and S.P. 2 did not adversely affect the initial growth of the seedlings, which Sesan slightly retarded. S.P. 2 appears to offer remarkable possibilities for seed treatment against bunt.

James (N.), Campbell (N. E. R.), & Gunner (C.). **Fundamental studies on a saltant of Helminthosporium sativum.**—*Canad. J. Res.*, Sect. C, 27, 6, pp. 274–283, 1 pl., 7 graphs, 1949.

A saltant of *Helminthosporium sativum* isolated in 1932 [*R.A.M.*, 12, p. 560; 28, p. 519] disappeared from six different natural soil samples in which it was cultured in the laboratory at the University of Manitoba within four weeks, while the indigenous fungi and bacteria persisted for nine weeks. In sterilized soil the saltant

could be reisolated after the same period but the numbers showed a downward trend. In spot inoculation tests antagonism to the saltant was shown by 22 of 221 isolates of fungi (from soil, grain, and air), 45 of 286 isolates of *Streptomyces* species, and 33 of 193 isolates of bacteria. Filtrates and autoclaved portions of filtrates from cultures of *Aspergillus flavus* and *Fusarium oxysporum* inhibited growth of the saltant. On the other hand, filtrates from three cultures of antagonistic bacteria failed to suppress growth. The same 22 fungal isolates and 25 of the *Streptomyces* isolates, when introduced separately into sterile soil containing the saltant, reduced the disease rating of barley seedlings below that produced by the saltant alone. It is concluded that the reduction of infection was due to the destruction of the saltant and not merely to a reduction of infectability. It appears that soil, both natural and heat-sterilized, normally contains a thermostable, filterable substance or substances antagonistic to *H. sativum*. This substance is produced by *A. flavus* and *F. oxysporum* and probably also by other species.

Poehlman (J. M.). **Agronomic characteristics and disease resistance of Winter Barleys tested in Missouri, 1943 to 1948.**—*Res. Bull. Univ. Mo.* 442, 28 pp., 1949.

From 1943 to 1948 at Columbia, Missouri, 249 winter barley varieties were tested for agronomic characteristics and disease resistance. Inoculations with *Ustilago nuda* [*R.A.M.*, 28, p. 568] showed that 57 varieties did not exceed 5 per cent. infection. The following hooded varieties had no smutted heads: CI 6571 Iredell (in three years), CI 6998 Huga (two), CI 7026 N.C. Hooded 26 (five), CI 7038 York Hooded (two), CI 7074 Marett Hooded 4 (two), and the following selections of Mo. E. Beardless: B 472 (five), B 507 (four), and B 538 (four). Of the foreign varieties, CI 1412 Abundio (four years), CI 4328–1 (five), CI 4966 (five), CI 5009 (four), CI 5091 (four), CI 5179 Hoku (five), CI 5180 Kada (five), CI 5185 Saru (five), CI 5238 Dobaku (four), and CI 6185 Deciduouslem (one) showed no infection.

Resistance to loose smut (*U. nigra*) [ibid., 27, p. 15] was also tested by artificial inoculation. Susceptible rough-awned Tennessee Winter types averaged 13 smutted heads per row and Reno 16. On the basis of one smutted head or less per 5 ft. row on the average over the five-year period 1944–48, 63 of the 249 varieties and strains tested were classified as resistant. There were no smutted heads in the hooded varieties CI 6574 Hooded 16, B 467 Sel. Kinroku, B 659 Sel. Kinroku, B 411 Sel. Mo. Early Beardless, B 538 Sel. Mo. Early Beardless, or in the following from the world collection: CI 4957 (Russia), CI 5087 (China), and CI 5938 (China). CI 6574 and B 467 were resistant to all nine races of *U. nigra*; B 411 and B 538 were resistant to six, and CI 5187, which averaged one smutted head per row in the five-year period, was resistant to all nine.

In inoculation tests to determine resistance to covered smut (*U. hordei*) [ibid., 28, p. 568] Reno averaged 15 smutted heads per row over the five-year period, the entire group of Tennessee Winter types 5, while 34 of the varieties tested had no smutted heads, including B 467 Sel. Kinroku, CI 4959, CI 4966, CI 5087, CI 5091, and CI 5187 Nohadak, which were resistant or immune from the other smuts. In 1948 15 varieties were inoculated with 13 races of the fungus and the following were resistant to all: B 467 Kinroku, CI 5187 Nohadak, B 355 Mo. Early Beardless Sel., and CI 6574 Hooded 16. Eight selections from Missouri Early Beardless, which averaged one to three smutted heads per row in five years, were resistant to nine races.

Mildew (*Erysiphe graminis hordei*) [ibid., 28, p. 330] was present in epidemic form each spring during the period 1943–48 except in 1947. Reaction of the differential varieties indicated that race 2 was present on Reno and race 10 on spring barleys in the field. Of the varieties grown in the United States only CI 7073 Marett Awnless and B 495 Missouri Early Beardless were highly resistant to

both spring and autumn infections. Kentucky 1, Poland, Wong, Calhoun, Sunrise, Tucker, and Missouri Early Beardless Selections B 351 and B 355 were moderately resistant. Sixty-six varieties from the world collection showed excellent resistance to both autumn and spring infection.

Notes on varietal resistance to scald (*Rhynchosporium secalis*) [ibid., 28, p. 60] were obtained in 1944 and 1945, when natural epidemics occurred in the nursery. Varieties rated as resistant in both years were CI 277 Scottish Pearl, CI 2159 Wisconsin Winter, CI 4677 Kentucky 36, CI 4678 Kentucky 6, CI 6377 Admire, CI 7070 Kansas South-East, CI 7075 Kirwin, CI 7157, Brier, CI 534 Alaska, CI 3384 Tennessee Beardless 5, CI 170 Mensury, CI 206 Han River, CI 257 Tennessee Winter, CI 876 Tennessee Winter, CI 895 Cusada, CI 896 Arabel, CI 1107 Cartouch, CI 2033 Ohio Winter, CI 2420, CI 3363, and CI 6485 Grossklappige. The hooded varieties were mostly susceptible. Many varieties from Chosen, resistant to mildew and to one or more of the smuts, were without exception extremely susceptible to scald.

Marudarajan (D.), Ramakrishnan (T. S.), Krishna Menon (K.), & Srinivasan (K.V.). **Ergot production and improvement.**—*Proc. Indian Acad. Sci.*, Sect. B, 31, 2, pp. 103–110, 1950.

The Madras Agricultural Department started large-scale cultivation of rye ergot (*Claviceps purpurea*) [*R.A.M.*, 24, pp. 369, 499] on the Nilgiris in 1942, and experiments, in which a culture obtained from Australia was used, have shown that the most satisfactory altitude for ergot production is at 5,600 ft. or more. The most promising rye varieties were Australian black winter and the local rye. The highest yields were obtained from crops sown in April and good yields were obtained from sowings up to June. Six to eight sprayings with spore suspensions were required for maximum infection (70 to 71 per cent.) and the best time was in the third week after emergence of the ears, when flower opening was at its peak.

In inoculations trials on 18 different Gramineae infection occurred on two of 200 wheat ears inoculated; three of 25 *Avenastrum asperum* and eight of 30 *Vulpia myuros* ears developed small sclerotia.

The quality of the ergot was improved by culturing from sclerotia containing a high alkaloid content, which was thus raised from 0·19 to 0·4 per cent.

Gattani (M.L.). **Control of secondary infection of downy mildew of Maize.**—*Curr. Sci.*, 19, 3, p. 90, 1950.

In September, 1949, a seven-acre block of maize in the area of the Indian Agricultural Research Institute, New Delhi, became severely affected by downy mildew (*Sclerospora philippinensis*) [*R.A.M.*, 15, p. 794; 20, p. 570], incidence being 100 per cent. The affected plants were stunted and the upper part had turned yellow in long streaks. Severe and non-severe types of symptoms were apparent, chlorosis being more conspicuous in one than in the other. Incidence of the former was about 2 per cent. The presence of hyphae in the growing points of severely affected plants suggested systemic infection.

Ten days after spraying with Bordeaux mixture (5–5–50) most of the crop regained its normal colour, though severely affected plants did not recover even after a second application.

Hoppe (P. E.) & Middleton (J. T.). **Pathogenicity and occurrence in Wisconsin soils of Pythium species which cause seedling disease in Corn.**—Abs. in *Phytopathology*, 40, 1, p. 13, 1950.

Decay in wounded maize kernels planted at low temperature in different Wisconsin soils ranged from none in scrub oak [*Quercus ilicifolia*] forest soil to nearly 100 per cent. in some cropped areas. Inoculation tests for pathogenicity were performed

with 138 isolates of *Pythium* (of which 80 are still undetermined) from rotted kernels removed from various soils. The average pre-emergence mortality in the uninoculated controls was 6 per cent. as compared with the following percentages for the species so far identified: *P. vexans* [*R.A.M.*, 28, p. 203] 20, *P. paroecandrum* [ibid., 28, p. 83] 53, *P. rostratum* [ibid., 22, p. 305] 59, *P. ultimum* 62, *P. debaryanum* 87, and *P. irregulare* [ibid., 28, p. 117] 89. The source and frequency of the species were as follows: Plainfield sand (oats preceding crop) 13 *P. irregulare*, one *P. rostratum*: the same (lucerne preceding) five *P. irregulare*, two *P. ultimum*; peat (maize preceding) six *P. ultimum*, four *P. debaryanum*: Miami silt loam (maize preceding) four *P. ultimum*, two *P. vexans*; Dodgeville silt loam (maize preceding) 20 *P. ultimum*; and Spencer silt loam (lucerne preceding) two *P. paroecandrum*, one *P. irregulare*, and one *P. debaryanum*. It is concluded that certain species of *Pythium* are associated with soil type but the association is affected by crop sequence.

Robles (L. H.). **The pathogenicity of Helminthosporium on Corn.**—*Phytopathology*, 39, 12, pp. 1020–1028, 2 figs., 1949.

In preliminary experiments to determine the relative prevalence and importance of species of *Helminthosporium* on different lines and varieties of maize in Minnesota, *H. sativum* was the pathogen most frequently isolated from diseased leaves, while *H. carbonum* [*R.A.M.*, 23, p. 293], *H. turcicum*, and *H.* Z (possibly a new species or a variety or race of *H. carbonum*) were also present. *H. sativum*, not hitherto reported as parasitic on maize, attacked it readily in inoculation experiments, though there were marked interracial differences in virulence, races 1, 2, 3, 4, 5, and 7 being moderately pathogenic to at least three varieties, whereas 6 and 8 caused only mild infection. A cultural variant of *H. carbonum*, designated race 1–1, was much less virulent than the parent race 1.

H. Z differs from the otherwise similar *H. carbonum* in its conidial dimensions, those of the former ranging from 36 to 238 by 10 to 26 (average 115 by 19) μ with 1 to 14 (average 9) septa, as compared with an average of 87 by 21 μ and 8 septa in the latter, as well as in pathogenicity to certain hosts, notably teosinte [*Euchlaena mexicana*], which sustained little damage from *H.* Z, whereas *H. carbonum* race 1 attacked it severely.

H. sativum infected a larger number of hosts than the other species tested, being more or less pathogenic to Marquis wheat, Barbless barley, sweet corn, Golden Bantam, Minhybrid 800 and 500, and Double Cross D4 maize, *E. mexicana*, and Sudan grass. Bonda oats was immune from all races of *H. sativum* except 5, which caused a trace of infection. *H.* Z attacked Sudan grass as well as maize, and *H. turcicum* was pathogenic to sweet corn, *E. mexicana*, and Sudan grass. Golden Bantam maize was susceptible to *H. carbonum* race 1 and moderately resistant to race 1–1, resistant to races 2, 3, 6, and 8 of *H. sativum*, moderately resistant to 1, 4, 5, and 7, susceptible to the two races of *H. turcicum*, and moderately susceptible to *H.* Z.

Mazzanti (L.). **Contributo allo studio farmacologico dell' Ustilagine del Granoturco. I. Saggi preliminari sui suoi principi attivi.** [Contribution to the pharmacological study of the Maize smut. I. Preliminary data on its active principles.]—*Arch. Sci. biol.*, 33, 2, pp. 97–111, 1949.

A full account is given of the first part of the author's study at the University of Siena on the pharmacology of maize smut (*Ustilagomaydis*) [*R.A.M.*, 19, p. 468; 22, p. 301] under the headings of procedures of extraction and purification of the active principle, some of its characteristics, action of the extracts on blood pressure and respiration (of rabbits), and toxicity of the pathogen (to rats). From the results of these preliminary experiments the active principles of *U. maydis* would appear to be non-alkaloidal.

Schneider (H.), Wallace (J. M.), & Dimitman (J. E.). **The pathological anatomy of bud-union tissues of Orange trees and its value in the diagnosis of quick decline.**—Abs. in *Phytopathology*, 40, 1, p. 24, 1950.

In orange trees showing the non-specific top symptoms of quick decline [in California: *R.A.M.*, 29, p. 258], radial sections reveal a series of changes in the phloem at the bud union. In the older, normally active phloem below the bud union the sieve-tubes are necrotic, callus is absent, and there may be hypertrophy of the parenchyma cells and lysis of the fat globules. Just above the union, in the scion, the sieve-tubes are collapsed but callus is still present, and fat globules occur in the parenchyma. Phloem production at the union during the disease is excessive, the cells are abnormally small, and there are usually no fibres. An anatomical analysis [ibid., 26, p. 241] of 61 suspected trees disclosed 46 positive, seven possible, three indeterminate, and five negative cases. To date, bud transmission tests from the trees in question have given positive results only in the first two categories (41 and 6, respectively). This method is therefore of value for the rapid indexing of suspected trees, especially for quarantine purposes. In conjunction with other symptoms it serves as a practical substitute for the more exacting bud transmission test, which requires many months.

Gogoi (T[ilottama].). **Notes on two strains of Fusarium oxysporum from the Oil Palm in the Belgian Congo.**—*Trans. Brit. mycol. Soc.*, 32, 2, pp. 171–178, 1 pl., 6 figs., 1949.

Studies were carried out at the University of Manchester on two strains of *Fusarium oxysporum* [*R.A.M.*, 28, pp. 272, 394] isolated from oil palm in the Belgian Congo by C. W. Wardlaw [ibid., 27, p. 523]; one (W) was associated with wilt disease and the other (P) with 'patch yellow' leaf disease. Four identical isolations from vascular strands and three identical ones from leaves were studied. The two groups differed in some respects, though by suitably modifying media they could be made to approximate very closely in morphology and physiology. On modified Brown's synthetic medium (glucose 2 gm.; potato starch 25 gm.; sodium nitrate 2 gm.; tri-potassium phosphate 1·25 gm.; magnesium sulphate 0·75; agar 15 gm.; water 1,000 ml.), which was used as the standard medium, strain W produced luxuriant aerial mycelium; the pigmentation of the medium after two weeks was indigo blue in patches near the centre, extending towards the periphery, and after four was dull violet black. Microconidia composed about 60 per cent. of the spores. Macroconidia had one to seven septa, five-septate ones predominating; the former measured 15 to 54 μ in length; the micro- and macroconidia were abstricted directly [from the main hyphae], and not from secondary branches; chlamydospore formation was abundant. Strain P on Brown's medium developed no aerial mycelium, but produced pionnotes. After two weeks a ring of indigo blue extended from about 2 cm. from the centre towards the periphery and after four the colour became more marked, while the whole culture was flesh pink [cf. ibid., 29, p. 293]. The macroconidia had one to nine septa, five-septate conidia predominating; the former measured 15 to 39 μ in length. The macroconidia were much more curved than in the W strain, but this was reversed when 15 per cent. rice starch was used in the medium. The microconidia constituted about 30 per cent. of the spores and they were abstricted from the tips of short secondary branches in rapid succession, accumulating to form spherical heads. Very few chlamydospores were formed.

When grown under comparable conditions on a synthetic medium containing glucose, potato starch, and the usual mineral ingredients, strain P cultures consistently showed zonation when exposed to the light but not in the dark, whereas strain W developed no zonation under either condition.

It is stated in a postscript that the wild type of strain W was found to be subject

to mutation, though not of the sectorial type, and the large macroconidia are of mutant type. These matters are to be dealt with in a further paper.

While the pathogenicity of the strains remains to be established and cross-inoculation experiments are awaited, it is of interest to note that *F. oxysporum* is associated with two widely different and apparently unrelated pathological conditions in the oil palm.

DADANT (R.). **Sur une nouvelle maladie du Coffea robusta en Nouvelle-Calédonie.** [On a new disease of *Coffea robusta* in New Caledonia.]—*Rev. gén. Bot.*, 57, 673, pp. 168–176, 1 pl., 1 graph, 1950.

Robusta coffee in New Caledonia is affected by a fungus disease which causes the leaves to turn yellow, hang down, dry uniformly, and fall off after 7 to 14 days. The whole tree dies. As soon as the first outward symptoms appear the wood of a considerable length of the trunk, roots, and, in many cases, the first main branches shows intense, widespread blackening. As a rule the centre of the wood is not discoloured. Newly cut trees not yet killed emit an odour resembling that of acetone or alcoholic fermentation. When the leaves have fallen the discoloration spreads rapidly over the trunk, branches, and roots. Affected trees usually occur singly.

The disease was first noticed at Sarramea in February, 1948, since when it has been found to be present in every coffee-growing area of New Caledonia, though in a less severe form and has, therefore, mostly escaped notice by growers.

Only the conidial state of the fungus was found. The mycelium produces numerous phialides, each bearing a chain of hyaline, cylindrical, smooth, one-celled conidia. In nature the fungus appears unable to traverse healthy bark, the fructifications occurring round borer holes. On naturally infected wood the hyphae are 3·7 to 6·5 μ in diameter; on maize agar the phialides are 55·5 to 81·4 μ long by 4·6 to 6·2 μ at the greatest diameter, and the phialospores 3·7 to 11·1 by 1·9 to 2·8 μ.

Inoculations of wounded Robusta and Arabica coffee gave positive results, Robusta trees dying in four months. In nature guava trees were also infected with the same disease, a strain of the fungus with identical cultural characters being isolated from them. About 50 cross-inoculations between coffee and guava all gave positive results. In the latter host the discoloration in the wood was dark reddish-chestnut, slightly violaceous.

The fungus appears to belong to *Thielaviopsis*, and if it should prove to be a new species the name *T. neocaledoniae* is suggested.

MAGIE (R. O.) & MILLER (H. N.). **Dust or dip treatment before storage controls Gladiolus rot.**—*Flor. Rev.*, 105, 2707, pp. 27–28, 1949. [Abs. in *Chem. Abstr.*, 44, 5, p. 2160, 1950.]

Brown rot of stored *Gladiolus* corms (*Fusarium* [*oxysporum* f. *gladioli*: *R.A.M.*, 29, p. 306]), following mechanical injury at digging time, is the cause of substantial losses in Florida in the Picardy variety and its sports, as well as in Corona and New Europe. The rot may also develop in corms washed to remove mud after harvesting. It may be combated by the application, immediately after digging or washing, of either (1) ½ lb. dowicide B and 1½ lb. dow 9 B, or (2) 4 lb. dowicide A, both in 50 gals. water, the corms being soaked for three to five minutes in the stirred mixture and then rapidly dried in shallow layers, with a fan if necessary, as slow drying tends to cause chemical injury. Infection at the corm base immediately after cleaning may be reduced by a prompt dip of 5 to 10 minutes in a suspension of 8 lb. wettable spergon in 50 gals. neutral to slightly acid water plus 1 to 2 lb. wettable DDT powder for thrips control, using trays or baskets in preference to bags. Corms rotting in storage should be dipped for ten minutes in new improved ceresan at half normal strength or wettable spergon, the latter being advisable for sprouted corms.

New improved ceresan at the recommended concentration should be applied to new corm and planting stocks, including cormels, of varieties susceptible to *F. oxysporum* f. *gladioli*.

Progress Report 1937–1947, Fibre Division, Central Experimental Farm, Ottawa, Canada.—47 pp., 27 figs., 2 graphs, 1950.

This report contains the following items of phytopathological interest. Liral Prince flax is slightly more susceptible to rust [*Melampsora lini*: *R.A.M.*, 28, p. 455] than other varieties and is therefore not recommended for Western Canada, where rust epidemics are frequent, but it can be grown safely in Ontario and Quebec where the disease is of little importance. High-quality flax seed treated with some of the common mercury dust preparations emerged a few days earlier than untreated, but the difference in yields was not great. In laboratory germination tests with poorer quality seed, the germination increase of treated seed was much more pronounced, ranging from 2 to 27 per cent. Rotation experiments demonstrated that a five-year rotation with hay or clover is sufficient to eliminate wilt (*Fusarium lini*) [ibid., 28, p. 562] from infested land. A seven-year rotation resulted in higher fibre yields for all the years on record.

Boursnell (Joan G.). **The symbiotic seed-borne fungus in the Cistaceae. 1. Distribution and function of the fungus in the seedling and in the tissues of the mature plant.**—*Ann. Bot., Lond.*, N.S., 14, 54, pp. 217–243, 1 pl., 6 figs., 1950.

A branching, septate fungal mycelium is present in the outer coat of the seeds of members of the family Cistaceae. In *Helianthemum chamaecistus* the fungus was observed to enter the seedling from the seed and spread throughout the plant, entering new tissue as it was differentiated at the apices. Only the embryo and endosperm did not contain the fungus. Seedling growth ceases at a certain point in the absence of the fungus: the plumule does not emerge and no branch roots are formed. The association between the seed-borne fungus and the higher plant is termed cyclical symbiosis.

Plant diseases and insect pests. Notes by the Biological Branch.—*J. Dep. Agric. Vict.*, 48, 3, pp. 138–140, 1950.

Violet plants in Victoria suffer serious losses from scab (*Sphaceloma violae*) [*R.A.M.*, 22, p. 250; 26, p. 153]. Pansy and wild violets are also affected. The fungus is most active during the summer; with the onset of cooler weather the diseased plants may partially recover. Four applications of 2–2–50 Bordeaux mixture, starting with the first appearance of the symptoms, give control.

Most *Daphne* plants in Victorian gardens are infected with an [unidentified] virus disease [cf. ibid., 22, p. 390]. It has spread rapidly during recent years and healthy plants are now rare. In the spring an irregular chlorotic mottle appears on the young, sometimes distorted leaves. Cuttings taken from infected plants develop severe symptoms on the first leaves that emerge. The disease reduces vigour and shortens the life of affected plants. The effects can be somewhat alleviated by manurial treatments, which, however, do not control the disease. Healthy stocks should be obtained and maintained for propagation purposes.

Tompkins (C. M.) & Hansen (H. N.). **Pansy leafspot, caused by Centrospora acerina, host range, and control.**—*Hilgardia*, 19, 12, pp. 383–389, 8 pl., 1950.

A destructive leaf spot of pansies and violas (*Viola cornuta*) caused by *Centrospora acerina* [*R.A.M.*, 23, p. 325; 26, p. 133] was first observed during the wet winter months of 1928–9 simultaneously in several nurseries in San Francisco and San Mateo counties, California. It recurred in succeeding winter seasons, inflicting serious losses. In April, 1941, it occurred in epiphytotic form in an Oakland nursery.

At first very small, irregularly distributed, blue-black, spherical to elliptical lesions appear on the upper leaf surfaces, and they may cause a wet, greasy appearance on the lower side. Petioles and inflorescences are also affected. Within a day or two the lesions enlarge to 5 mm. or more and develop a light tan centre surrounded by a blue-black ring. On older leaves the tissues around the lesions may form a pale green, chlorotic halo. Severely infected plants die promptly. Parsnip plants developed no leaf infection, but dark brown lesions were present at or near the crown of the roots.

Steele's Jumbo pansy and Blue Perfection viola, inoculated with spores from a pansy isolate in a cold greenhouse (13° to 18° C.) all developed symptoms on all aerial parts within 24 hours and severe infection after 48 hours. They died within a week. The control plants remained healthy. The fungus was reisolated from each infected plant. In later tests under exceptionally favourable environmental conditions pansy plants showed severe symptoms 12 hours after inoculation. Reciprocal inoculations demonstrated the identity of a celery isolate from A. G. Newhall [ibid., **23**, p. 325] with the California pansy isolate.

Campanula medium, *Aquilegia* sp, *Delphinium cultorum*, *Petunia hybrida*, *Ranunculus asiaticus*, *Scabiosa atropurpurea*, *Lobelia hybrida*, *Omphalodes linifolia*, *Pentstemon barbatus*, *Centaurea*, and *Cyanus* were all highly susceptible to natural infection and developed symptoms similar to those on viola. Chicory, lettuce, dandelion, and parsnip are also susceptible to natural infection. *Cyclamen indicum*, China aster, *Rhododendron indicum*, *Gerbera jamesonii* var. *transvaalensis*, *Begonia semperflorens*, *Primula obconica*, *Chrysanthemum maximum*, *C. coccineum*, *Senecio cruentus*, *Geranium sanguineum*, *Myosotis alpestris*, *Geum chiloense*, and *Malcomia maritima* were infected by inoculation, as also were spinach, pea, broad bean (*Vicia faba*), caraway, cabbage, celery, cauliflower, Chinese cabbage, tomato, bean (*Phaseolus vulgaris*), carrot, lettuce, and parsley.

Excellent control was obtained by spraying the beds during the rainy season with greenol and mil-du-spra (both these products contain a copper salt in an oleaginous base) at a concentration 1 to 800; they leave no noticeable residue on the leaves.

Tompkins (C. M.). **Botrytis blight of Bouvardia flowers.**—*Hilgardia*, **19**, 13, pp. 399–400, 2 pl., 1950.

In April, 1949, cut flowers of *Bouvardia humboldtii* var. *grandiflora* stored in waxed boxes (having previously been sprayed with water) in refrigerators at 48° F. in San Francisco, were severely affected by a blight, caused by *Botrytis cinerea*. Small to large, pale brown lesions developed on buds and open flowers, and frequently coalesced at a later stage, forming dark brown areas on the shrivelled and deformed flowers. Isolates of the fungus proved pathogenic to healthy flowers in standard containers in a refrigerator, severe infections occurring 24 hours after inoculation. The fungus was reisolated. Both pink and white *Bouvardia* flowers appear to be equally susceptible. Spraying of the flowers with an aqueous solution of greenol [see preceding abstract] (1 to 800) immediately after packing gave complete control.

Tompkins (C. M.). **Botrytis stem rot of tuberous-rooted Begonia.**—*Hilgardia*, **19**, 13, pp. 401–405, 2 pl., 1950.

During the last decade a serious stem rot of potted *Begonia tuberhybrida* plants has been prevalent in greenhouses at Capitola, California, the annual losses ranging from 20 to 50 per cent. The same disease was reported from the Santa Cruz and San Francisco regions. The development of the causal organism, *Botrytis cinerea* [cf. *R.A.M.*, **25**, p. 262 and preceding abstract], is favoured by cool, foggy weather, overwatering, and crowding of the plants.

Dark brown, water-soaked, occasionally sunken or shrivelled, irregular lesions occur mostly at or near the base of the stem, but may also develop at some distance above soil level. Sometimes the lesions coalesce, or the stem may shrivel and mummify. In advanced stages all internal stem tissues are invaded and the stem breaks at the lesion site. Leaves, petioles, and inflorescences may also become infected. The fungus enters through leaf scars and growth cracks caused by heavy nitrogenous fertilization. All seedlings inoculated in the greenhouse with isolates of *B. cinerea* became infected after five to seven days, while the controls remained healthy. Reisolates proved highly pathogenic.

Control measures include the removal of all debris, excision of the infected areas, and painting wounds, leaf scars, and growth cracks with zerlate paste. Varieties with hairy stems were found to be much less susceptible than those with smooth ones.

CIFERRI (R.). **Segnalazione del Coleosporium senecionis (Pers.) Lév. su Calendula officinalis L. a Palermo.** [Report of *Coleosporium senecionis* (Pers.) Lév. on *Calendula officinalis* L. at Palermo.]—*Notiz. Malatt. Piante, 1949*, 6, p. 44, 1949. [Mimeographed.]

The author reports that *Coleosporium senecionis* was found on *Calendula officinalis* [*R.A.M.*, 28, p. 456] near Palermo in 1933, the interest of the record being that it comes from a Mediterranean area.

MUNTAÑOLA (MARÍA). **Descripción de una nueva enfermedad del Girasol.** [Description of a new disease of the Sunflower.]—*Rev. Invest. agríc., B. Aires*, 2, 4, pp. 205–212, 6 pl., 1948. [Received May, 1950.]

The following are the principal symptoms of a hitherto undescribed disease which caused heavy damage in the sunflower plantings at Pergamino, Argentina, in 1942: a more or less clearly discernible mottling of the foliage; elongation of the leaves, vein-banding, and torsion of the petioles; development on the leaf blades of necrotic lesions, nearly always surrounded by a chlorotic halo; lineal accumulation of chlorophyll in stems, producing stripes that subsequently darkened to black and expanded into large, black patches of a moist and greasy aspect; death of the petioles and leaves, starting at the base, the black and shrivelled leaves drooping on the stem without falling; disorganization of the medulla of the stem; and apparently sudden death of the plants either before seed is formed or before it ripens, the dry, black stems being slightly inclined at the base and the heads bent down towards the ground.

The disease is widely distributed in the Republic and causes serious losses in the extensive sunflower plantings of Buenos Aires, Entre Ríos, and Sante Fé, while in Tucumán and Córdoba the crop reductions are of varying extent. The symptomatology is suggestive of a virus infection, and further support is lent to this hypothesis by the positive results of inoculation experiments performed by Dr. Blanca A. Traversi with diseased leaf material. These were successful not only on sunflower and the common weed hosts, such as *Verbesina encelioides* and *Datura ferox*, but on a number of other plants of different families. Dr. Traversi proposes to publish a separate report on some characteristics of the virus. Soriano has referred to a virus disease of the mosaic type on sunflower in Argentina [*R.A.M.*, 13, p. 317], but without particulars which might serve as a basis for comparison with the infection under observation.

CLAYTON (C. N.) & ALLISON (J. L.). **Leaf spot of Crotalaria caused by Septoria.**—Abs. in *Phytopathology*, 40, 1, p. 5, 1950.

A leaf spot of *Crotalaria spectabilis*, an important cover crop on many peach orchard soils in the Sand Hill area of North Carolina, was first observed in June,

1948. The infected cotyledons and basal leaves turned yellow and dropped. As the season advanced the epiphytotic increased in intensity, and by late September average plant defoliation was estimated at 85 per cent. *C. mucronata* var. Giant striata was also attacked, but less severely than *C. spectabilis*. The leaf spot was again prevalent in 1949. The lesions are necrotic, circular (1 to 3 mm.), with a reddish-brown margin and a tan to nearly white centre in which one to several pycnidia are discernible. A species of *Septoria* (probably new) was consistently associated with and isolated from the spots. Typical symptoms were produced on the leaves of *C. spectabilis* seedlings in inoculation tests under controlled conditions and the fungus was readily reisolated. This is the first record of a *Septoria* causing leaf spot of *Crotalaria*.

Johansen (G[udrun]). **Infection experiments with Ascochyta imperfecta on Trefoil (Medicago lupulina).**—*C.R. Ass. int. Essais Semences*, 14, 2, pp. 187–189, 1948. [Received March, 1950.]

Although *Medicago lupulina* seeds with heavy natural infection by *Ascochyta imperfecta* [*R.A.M.*, 17, p. 13; cf. 28, p. 577] often give a healthy crop in Denmark, it was found in different infection experiments, in which seedlings were sprayed with spore suspensions from pure cultures of the fungus, that they became infected and many died after twelve days. Inoculated and healthy seed germinated in a ratio of 23 : 100. When seeds were sown in infested soil in a pot three germinated compared with 182 in the non-infested pot. It is concluded that plants from heavily infected seed either die before they appear or later as seedlings. If the soil is heavily infested pre-emergence killing occurs.

McCallan (S. E. A.). **Factors influencing spray injury by glyoxalidine derivatives to potted Apple trees.**—*Contr. Boyce Thompson Inst.*, 16, 1, pp. 21–26, 1950.

In laboratory tests the leaves of young potted McIntosh apple trees were injured when sprayed with derivatives of glyoxalidine [*R.A.M.*, 28, p. 441; 29, pp. 31, 32], the bronzing of lower surfaces resembling that reported in the field from early season sprays with the 341 C formulation [loc. cit.]. High concentration, high temperatures of 90° F. or above, and high humidity were found to be the most important factors inducing injury. A modified formulation (341 SC) containing essentially pure 2-heptadecylglyoxalidine in isopropanol plus lime, was less than one-quarter as toxic as 341 C.

Both 341 C and 341 SC controlled apple scab [*Venturia inaequalis*: loc. cit.] in greenhouse tests, and identical control of foliage scab was obtained in field tests both at ½ and 2 lb. (active ingredient) per 100 gals.

Howlett (F. S.) & Fowler (T. E.). **New hope for Pears in Ohio.**—*Ohio Fm Home Res.*, 35, 262, p. 12, 2 figs., 1950.

During the past 13 years at the Ohio Agricultural Experiment Station only two pear trees top-worked on Old Home have been lost as a result of fireblight [*Erwinia amylovora*: cf. *R.A.M.*, 29, pp. 264, 290], as against over 100 grown on other stocks or on their own trunks. If Old Home is used top-working forms a blight-resistant framework greatly reducing, if not preventing, loss of trees from girdling, even though the susceptibility of the variety top-worked is not decreased. All standard pear varieties appear to be compatible with Old Home, which is not completely immune, but may be the means of maintaining pear production in Ohio.

Supplementary control measures consist in pruning very lightly, if at all, restricting growth by applying a nitrogen-carrying fertilizer intermittently, growing the trees in sod without mulching, and spraying the trees when in bloom with weak Bordeaux mixture; infected parts should be cut away at once and a disinfectant applied to the wound.

Ghillini (C. A.). **Sul 'marciume acquoso' delle Susine provocato da 'Taphrina pruni' Tul.** [Watery rot of Plums caused by *Taphrina pruni* Tul.]—*Riv. Fruttic., Vitic., Ortic.*, 11, 2, pp. 75–81, 1 fig., 1949. [French and English summaries.]

Further studies at the Plant Pathology Institute, University of Bologna, have confirmed that spots produced on certain varieties of plum by *Taphrina pruni* initiate a watery rot of the ripening fruits [*Agricoltore ferr.*, 5, 1948]. The varieties Fiorenza, Santarosa, Shiro, and S. Pietro are particularly susceptible. Burbank remained immune.

Trees of all these varieties were sprayed with 4 per cent. copper-lime mixture on 2nd February, 1948, and with 2 per cent. copper-lime plus 0·1 per cent. sandovit as a sticker, on 5th March. To every five treated trees of each variety one was left unsprayed. A few days after petal fall the only diseased plums observed were on unsprayed Fiorenza and Santarosa trees, and these soon became mummified. *T. pruni* was isolated from the mummified fruits, asci being generally visible on the surface. The pathogen was also isolated from some Fiorenza and Santarosa fruits, which, after a few days' apparently normal growth, became deformed and partially shrivelled, with an opaque skin. These developed on branches which had already borne mummified fruits.

There was a definite correlation between spring infection of certain plum varieties (probably through the flower ovaries) followed by the production of mummified fruits, and the development of watery rot at maturity in 1947 and 1948. Further studies are in progress to determine the method of penetration, the period of dormancy, and the reproduction of the fungus in the host.

Thiollière (J.). **Le Coryneum du Pêcher.** [*Coryneum* of Peach trees.]—*Bull. Soc. pomol. Fr.*, 76, 1, pp. 10–12, 1949.

The author describes briefly the economic importance of, varietal reaction to, and symptoms on leaves, fruit, and branches due to the peach shot hole fungus (*Clasterosporium carpophilum*) together with the factors favouring its development and control measures [*R.A.M.*, 28, p. 406].

Neergaard (P.). **Kirsebærbladpletsyge (Higginsia hiemalis), en for Danmark ny, alvorlig kirsebærsygdom.** [Cherry leaf spot disease (*Higginsia hiemalis*), a serious Cherry disease new to Denmark.]—*Gartnertidende*, 65, 46, pp. 487–489, 3 figs., 1949.

In connexion with the discovery in September, 1949, of the occurrence in Denmark of cherry leaf spot (*Coccomyces hiemalis*), an account is given of the geographical distribution, symptoms, and etiology of the disease, the life-history of the causal organism, varietal reactions to infection, and control measures, based on experience in the United States. In one of the affected nurseries the leaf spot is believed to have been present since 1946.

Candioli (P.). **La 'moria' del Ciliegio.** [Cherry decline.]—*Ital. agric.*, 86, 6, pp. 373–383, 8 figs., 1949.

Further investigations on cherry decline in the Verona district of Italy [cf. *R.A.M.*, 28, p. 69] have shown that soil dryness, the use of stocks unsuited to the soil, stagnation of water in the soil, hail injury, attacks by crown gall (*Bacterium tumefaciens*) and *Coryneum beijerinkii* [*Clasterosporium carpophilum*: ibid., 10, p. 774], physiological incompatibility resulting from the use of an unsuitable stock [cf. ibid., 21, p. 463], and root rot caused by *Rosellinia necatrix* all contribute to the condition.

An examination made in 1939 showed a reduction in the annual number of deaths

due to decline. Regular rainfall, protection against pests and diseases, and pruning wilted trees where this would prove beneficial, combined with measures against the known causes of decline should reduce the incidence considerably.

EATON (J. K.). **The cause of black blotch disease of the Raspberry.**—*J. hort. Sci.*, 25, 2, pp. 128–131, 3 pl., 1950.

During an investigation at East Malling of the black blotch disease of raspberries, formerly attributed to *Cryptosporium minimum* [*R.A.M.*, 16, p. 229], it was found that the lesions are caused primarily by the toxic action of iron compounds distributed by rain from rusty iron wire upon which the affected canes are trained. The condition was induced artificially in Norfolk Giant canes secured with rusty iron wire or receiving 12 spray applications of iron in suspension or as a solution. No blotches appeared on canes secured with galvanized wire or sprayed with zinc solutions.

NYLAND (G.). **Studies on some unusual Heterobasidiomycetes from Washington State.**—*Mycologia*, 41, 6, pp. 686–701, 4 figs., 2 graphs, 1949.

Sporidiobolus n. gen., described to accommodate a heterobasidiomycetous fungus isolated from a pustule of *Phragmidium rubi-idaei* in a raspberry leaf collected near Puyallup, Washington, is characterized by ballistospores (spores forcibly abjected by drop-excretion mechanism) produced on tips of sterigmata of variable length. The sterigmata arise as branches from the mycelium or directly from ballistospores; the ballistospores reproduce by repeating spores or by yeast-like budding. The mycelium is septate, with clamp-connexions. Terminal or intercalary, brown, thick-walled chlamydospores are produced on the mycelium.

S. johnsonii n.sp. has slightly curved, asymmetrical, reniform-lunate ballistospores measuring 6 to 13 by 3·5 to 6·5 (average 9 by 5) μ, hyaline by transmitted light and salmon pink in mass. The chlamydospores, hyaline when young, golden brown when mature, are 10 to 16 (average 12) μ in diameter, with a wall 1 to 1·5 μ thick.

POOTJES (J. R.). **Beschrijving en onderhoud van eenige sproei- en stuifwerktuigen voor de bestrijding van plantenziekten.** [Description and maintenance of some spraying and dusting apparatus for the control of plant diseases.]—*Landbouw*, 21, 9, pp. 456–471, 4 diags., 1949.

Full descriptions are given of the construction of some spraying and dusting machinery used for plant disease control in Indonesia, with directions for their application and maintenance. The three types of spraying equipment in use are the non-automatic [ordinary] knapsack (10 to 15 l. capacity), automatic (high pressure) knapsack (10 to 18 l.), and the vat sprayer (25 to 100 l.), of which the last-named is seldom employed, being both cumbersome and costly. Dusting machines are also of three kinds, namely, the hand bellows (1 kg.), the knapsack bellows (5 kg.), and the rotary duster.

WIT (J.). **De toepassing van bestrijdingsmiddelen in kassen.** [The application of plant-protectives in glasshouses.]—*Meded. Direct. Tuinb.*, 12, 8, pp. 541–552, 6 figs., 1949. [English summary.]

Closed spaces, such as glasshouses and warehouses, offer greater possibilities of disease and pest control than those available out-of-doors. Besides spraying and dusting, indoor crops can also be protected by space treatment, using such methods as gassing, vaporization, fumigation, and atomization. These treatments are not applied to the crop itself but to the free space, which is completely filled with the plant-protective by means of air currents and diffusion. Advantages and disadvantages are inherent in all these methods, and in each case the choice must be

based on due consideration of the several factors concerned, e.g., the plant-protective, the kind of crop and its stage of development, and the prevailing wind and temperature. In respect of labour-saving, however, space treatments are superior to all others and therefore preferable if equally effective otherwise. Modern means for the procurement of 'mist' sprays, i.e., aerosol bombs, and the aerocide and atomizer systems, have considerably widened the possibilities in this direction.

McCallan (S. E. A.). **Some chromate complexes and organic compounds as seed protectants.**—*Contr. Boyce Thompson Inst.*, 16, 1, pp. 5–20, 1950.

From a series of 640 chromate and organic compounds tested as possible seed protectants [*R.A.M.*, 28, p. 151] in thegreenhouse on Perfection peas, Detroit Dark Red beet, Honey Rich cantaloupe, Ioana sweet maize, Penn State Ballhead cabbage, Giant Nobel spinach, and Henderson Bush Lima bean (*Phaseolus limensis*) [*P. lunatus*], the following were selected as the most promising in promoting high emergence: mercury zinc chromate complex (No. 224) [loc. cit.], copper zinc chromate complex (No. 640), and the reaction product of dimethyldithiocarbamate and sulphur dichloride (No. 5400). Cupric-γ-chloroacetoacetanilide (No. 854) and γ-chloroacetoacetanilide (No. 201) also gave good protection, but were eliminated because of irritation to human skin.

In 1949 field tests at Yonkers (New York State), Bridgeton (New Jersey), Wooster (Ohio), Ames (Iowa), and Belle Glade (Florida) were carried out in comparison with thiuram and chloranil on pea, spinach, beet, Lima bean, muskmelon, cabbage, snap bean (*P. vulgaris*), tomato, and maize. Greenhouse tests were made on Hegari and Martin's Combine sorghum. No. 224 gave outstanding results on maize at all stations. It was also effective on pea, cabbage, and sorghum, and fairly effective on spinach and muskmelon. It was injurious to Lima bean and apparently ineffective on beet, snap bean, and tomato. No. 640 ranked first on pea, and fair results were obtained on the other crops except Lima bean, to which it was probably injurious. No. 5400 was the most generally effective compound; it was excellent on Lima bean, maize, and cabbage, gave good results on beet and muskmelon, and fair on the other crops.

Limited tests indicated that the treated seed did not lose its viability in storage and there was no reduction in the effectiveness of the chemical.

McCallan (S. E. A.). **Factors influencing deposition in the vacuum bell jar duster.**—*Contr. Boyce Thompson Inst.*, 16, 1, pp. 27–37, 3 figs., 4 graphs, 1950.

Deposition of dusts mixed with water-soluble dyes on bean plants (*Phaseolus vulgaris*) was examined in a modified vacuum bell jar duster (Farrar, M.D. *et al.* Vacuum dusting of insects and plants.—*J. econ. Ent.*, 41, pp. 647–648, 1948). Deposition was found to be directly dependent on the weight of the sample and leaf area. The deposit increases slightly with decrease in pressure within the bell jar; 240 mm. mercury was adopted as standard. There was little increase of deposit on the lower leaf surface after five seconds from the time of discharging the dust, but on the upper surface it may continue for a minute or more. Of the different diluents examined, Eastern magnesium talc, Pyrax ABB, Wyobond Wyoming bentonite, Cherokee clay, and Attaclay were the most satisfactory.

New fungicides.—*Agric. Chemicals*, 5, 1, pp. 31–33, 1950.

At a meeting of the American Phytopathological Society, 28th to 30th December, 1949, some of the subjects discussed were the registration of fungicides, toxic tolerance, phytotoxicity, plant disease forecasting, and the results of the 1949 fungicide tests. Several new fungicides were introduced, including a zinc product, NU-Z, for the control of bacterial leaf spot of peach [*Xanthomonas pruni*], cadminate

for turf diseases [*R.A.M.*, 29, p. 85], and OS 840 (chlorobromopropene) for soil fungi.

HORSFALL (J. G.) & RICH (S.). **Protective action of bis (2-hydroxy, 5-chlorophenyl) sulfide.**—Abs. in *Phytopathology*, 40, 1, p. 13, 1950.

Laboratory tests in 1943 demonstrated the high tenacity of bis (2-hydroxy, 5-chlorophenyl) sulphide (Cr-305) and its toxicity to *Sclerotinia fructicola* but not to *Stemphylium sarciniforme*. In the field the compound proved highly effective in the control of apple scab [*Venturia inaequalis*] and rose black spot [*Diplocarpon rosae*]. The tenacity of Cr-305 gives it a long residual effect which is of interest in apple scab control. Young foliar infections are also eradicated. In 1949 the experimental formulations caused russeting of apple fruit, but damage to the leaves has so far been negligible. Trials with about 50 analogues of Cr-305 are in progress.

WESTERDIJK (JOHANNA). **The concept 'association' in mycology.**—*Antonie van Leeuwenhoek J. Microbiol Serol.*, 15, pp. 187–189, 1949.

The author proposes to use the ecological term 'association' for the specific combination of micro-organisms found in decaying biological substrata. Of the examples given mention may be made of the following. In wood found in soils *Trichoderma viride* [cf. *R.A.M.*, 26, p. 410] dominates the situation in the first stage of decay and later, when saccharification is proceeding, it is joined by *Penicillium* spp. On jute [ibid., 28, p. 396], sisal, and similar fibres *Mucor racemosus*, *M. spinosus*, and *Penicillium* spp. are found associated. Cotton and linen are attacked by *Cladosporium herbarum* [cf. ibid., 28, p. 584], *Alternaria tenuis*, *Pullularia pullulans*, and *Stemphylium* and *Stysanus* spp., and paper by *Alternaria chartarum*, *Chaetomium* spp., *Stysanus stemonites* [cf. ibid., 26, p. 270], and *Cladosporium herbarum*. A striking example is afforded by mouldy oranges, on which *Penicillium italicum* and *P. olivaceum* [*P. digitatum*] are always found whatever the type of fruit or its country of origin.

MOREAU (C.). **Les maladies parasitaires des principales cultures coloniales. Revue bibliographique. IV.** [The parasitic disorders of the principal colonial crops. Bibliographical review. IV.]—*Rev. Mycologie, Suppl. colon.*, 14, 2, pp. 89–99, 1949.

In this fourth review [cf. *R.A.M.*, 29, p. 110] the author gives further notes (arranged under hosts) from the literature published from 1947 to 1949 on the principal diseases of colonial crops. A bibliography of 45 titles is appended.

GÄUMANN (E.). **Principles of plant infection.**—xvi+543 pp., 183 figs., 8 diags., 119 graphs, 1 map, London, Crosby Lockwood & Son, Ltd., 1950. 63*s*.

This is the authorized English edition (translated by Professor W. B. BRIERLEY, with the assistance of Miss Kathleen Secker, Mrs. Balfour-Browne, Dr. Joan Moore, and Dr. W. W. Schwabe), of the above-mentioned treatise, a note on which has already appeared [*R.A.M.*, 25, p. 173].

MILBRATH (D. G.). **Plant disease control.**—*Bull. Dep. Agric. Calif.*, 39, 1, pp. 49–55, 1949.

Discussing the question of plant diseases in their relation to an organized system of control, the author points out that skill is required to evaluate the importance of a pathogen, which depends on a number of factors and may be much greater in one locality than in another. While there are many organized systems of control, the universality of plant diseases obliges any organized system to consider its field of operations as world-wide. In the United States every administrative division has, directly or indirectly, some form of plant protection in co-operation with the next

larger division. The chief functions of an organized system of plant disease control are the prevention of disease introduction, the discovery of new diseases within the territory concerned, and the prevention of the spread of old and new diseases after their presence has been discovered.

It is presumed that new plant disease situations are likely to arise. Their discovery in the incipient stages will greatly increase the likelihood of early suppression. If the new disease becomes established, the mode of culture of the affected crop will probably have to be adjusted in accordance with the behaviour of the pathogen, if necessary by regulatory measures.

FENAROLI (L.). **Il servizio d'introduzione di piante e semi negli Stati Uniti d'America e l'opportunità di un' analoga iniziativa in Italia.** [The plant and seed introduction service in the United States of America and the advisability of an analogous project in Italy.]—*Ann. Sper. agr.*, N.S., 2, 5, *Suppl.*, pp. lxxxiii–cv, 1948. [English summary.]

The author describes the origin, development, and work of the Division of Plant Exploration and Introduction of the United States Department of Agriculture and suggests that a similar project should be initiated in Italy.

An inventory is made of the seed and plant material introduced into Italy during 1947 through the Maize Experiment Station, Bergamo [see next abstract]. It includes the sweet chestnut (*Castanea mollissima*) varieties FP 1270 C, FP 1272, FP 1277 B, and FP 1289 resistant to *Endothia parasitica* [*R.A.M.*, 29, p. 182]; the potato varieties [ibid., 29, p. 168] B 61–3, B 76–43, and Menominee resistant to common scab (*Actinomyces scabies*) and *Phytophthora infestans*; X 590–7 resistant to *A. scabies*; B 69–16, B 70–5, B 73–10, B 142–7, and Sequoia resistant to *P. infestans*; Katahdin, Mohawk, Chippewa, Irish Cobbler, Earlaine, and Houma, resistant to mild mosaic; Sebago resistant to *P. infestans*, *A. scabies*, and mild mosaic, and Teton resistant to ring rot [*Corynebacterium sepedonicum*]; and the tomato selections 6–5–34, 6–5–36, 6–5–41, 6–5–44, and 6–102–15, resistant to fusariosis [*Fusarium bulbigenum* var. *lycopersici*].

FENAROLI (L.). **Le introduzioni di piante e semi eseguite dalla Stazione Sperimentale di Maiscoltura nel 1948 (nn. 48001–48310).** [Plants and seeds introduced by the Maize Experiment Station in 1948 (Nos. 48001–48310).]—*Ann. Sper. agr.*, N.S., 3, 5, *Suppl.*, pp. ix–xxix, 6 figs., 1949. [English summary.]

This is a catalogue of maize, sorghum, potato and vegetable introductions received by the Maize Experiment Station, Bergamo, during 1948 [see preceding abstract]. They include the maize varieties A 116, A 73, A 131, A 148, A 322, A 375, NY 1, Ia 153 resistant to *Ustilago maydis*, Oh 02 and Oh 65 resistant to helminthosporiosis [*Helminthosporium turcicum*], Oh 51 resistant to both these diseases, and Hale's Best 45 melon resistant to *Peronospora* [*Pseudoperonospora cubensis*].

PINTO-LOPES (J.). **Culture-collection of Hymenomycetes.**—40 pp., Faculdade de Ciências de Lisboa, 1949. [Received April, 1950.]

This is a list of 255 cultures of Hymenomycetes of 165 species maintained at the Faculty of Sciences, University of Lisbon. It includes the collection of Professor A. Quintanilha. Most of the Agarics from which isolations were made are in the Herbarium of H. Romagnesi. Cultures collected in Portugal are listed separately.

MARKERT (C. L.). **Sexuality in the fungus Glomerella.**—*Amer. Nat.*, 83, 812, pp. 227–231, 2 figs., 1949.

From his studies on sexuality in *Glomerella* [no species specified: *R.A.M.*, 25, p. 407; 28, p. 298; 29, p. 218] the author concludes that the different degrees of

fertility exhibited by the various strains are controlled by complementary genetic factors, which exert their influence partly by means of diffusible substances. Thus, the feeble fertility of some strains is enhanced by substances diffusing from a strongly fertile strain.

HARROLD (C. E.). **Studies in the genus Eremascus. I. The rediscovery of Eremascus albus Eidam and some new observations concerning its life-history and cytology.** —*Ann. Bot., Lond.*, N.S., 14, 54, pp. 127–148, 2 pl., 10 figs., 1950.

The original description of *Eremascus albus* Eidam, a fungus which has not been seen since 1883, has been generally confirmed and amplified from studies at the Botany School, Cambridge, using five isolates from mustard powder, mincemeat, and jam. The ascospores are 7·7 by 6·5 μ and differ appreciably from Eidam's measurements (5·2 to 5·5 μ).

RIDDELL (R. W.). **Permanent stained mycological preparations obtained by slide culture.**—*Mycologia*, 42, 2, pp. 265–270, 17 figs., 1950.

In this method of slide-culturing used at Duke University, Durham, North Carolina, 1 cm. squares are marked out with a needle over a layer of agar 2 mm. deep in a Petri dish and a square transferred to a cool, sterile slide. An inoculation is made at the centre of each edge of the block and a coverslip placed over it. The slide is transferred to a moist chamber kept damp by 20 per cent. glycerol in water, which prevents the slide from fogging. When growth is from 1 mm. wide to within 3 mm. from the coverslip edge the slip is lifted off and the agar block removed, leaving four areas of growth on the slide and the coverslip. A drop of 95 per cent. ethyl alcohol is applied to the centre of each of the rings of growth and flows outwards to wet the fungus. A drop of lactophenol blue is then applied. Both the slide and the slip are used to make separate mounts. The coverslips are fixed by applying coloured nail lacquer.

NEILSON JONES (W.) & TREVAN (J. W.). **Preservation of fungal sporophores.**—*Nature, Lond.*, 165, 4200, p. 692, 1950.

A method of preserving fungal sporophores is described. They are immersed for a minute or so in acetone to which solid carbon dioxide has been added, dried in a high vacuum while frozen, then kept in an evacuated desiccator over phosphoric oxide or silica gel for a few days, and finally immersed in 'seekay' artificial wax grade *R* 93 for 10 to 30 seconds. Most of the products so treated show a close morphological resemblance to the living sporophores, retain their colour well, and are very hard.

WHIFFEN (ALMA J.). **The activity in vitro of cycloheximide (actidione) against fungi pathogenic to plants.**—*Mycologia*, 42, 2, pp. 253–258, 1 graph, 1950.

The growth *in vitro* of thirty-three plant pathogenic fungi was completely inhibited by cycloheximide (actidione) [*R.A.M.*, 29, p. 271] at concentrations of 40 μgm. per ml. or less after 48 hours or from 0·125 to 100 μgm. per ml. after 72 hours incubation at 24° C. Particularly sensitive (complete inhibition in 48 hours by concentrations of 5 μgm. or less) were *Sclerotinia fructicola* [see above, p. 371], *Diplocarpon rosae*, *Physalospora tucumanensis*, *Diaporthe citri*, *Endothia parasitica*, *Venturia inaequalis*, *Ustilago tritici*, *U. zeae* [*U. maydis*], *Heterosporium iridis*, *Cladosporium fulvum*, *Diplodia zeae*, *Colletotrichum lagenarium*, and *Sclerotium rolfsii*.

BRIAN (P. W.). **The production of antibiotics by micro-organisms in relation to biological equilibria in soil.**—*Symp. Soc. exp. Biol.* 3, pp. 357–372, 1949.

Several examples of microbiological antagonism in soil are discussed [*R.A.M.*, 29, p. 40]. In certain cases there is strong evidence that the production of antibiotic

substances by an organism or group of organisms has a suppressive effect on the multiplication or metabolic activity of another organism or group of organisms. Preliminary results indicate that certain antibiotics are quite stable in soil and penicillin may last sufficiently long in certain neutral soils to be biologically effective.

Gottlieb (D.) & Siminoff (P.). **The role of antibiotics in soil.**—Abs. in *Phytopathology*, 40, 1, p. 11, 1950.

The presence of either *Streptomyces griseus* [*R.A.M.*, 28, pp. 75, 636] or *Aspergillus clavatus* [ibid., 27, pp. 203, 488] in sterilized soil inhibits the reproduction of *Bacillus subtilis*. The inhibitory action of *S. griseus* is not due to streptomycin production, for even 500 μgm. per gm. sterile soil will not prevent the growth of the test organism. Streptomycin in high concentrations is inactivated in sandy brown loam and in black clay loam soils, this inactivation being due in part to adsorption by the clay in the soil. Moreover, a non-streptomycin-producing mutant of *S. griseus* inhibits the development of *B. subtilis* in soil. Other basic antibiotics are also adsorbed by clay, whereas clavacin, an acidic material, is only partially inactivated. The results of preliminary tests point to antibiotic activity in an eluate from soil containing *A. clavatus*.

Brooker (L. E.) & Clark (A. F.). **Mould infestation in houses.**—*Tech. Bull. N.Z. State Advances Corp.* 10, 10 pp., [undated]. [Mimeographed.]

This technical bulletin summarizes in popular terms information on the infestation of the fabric of new houses in New Zealand by species of *Cladosporium* and *Penicillium*, the salient points of which have already been noticed [*R.A.M.*, 23, p. 473; 24, p. 240].

Hindson (W. R.) & Mortensen (K. N.). **Fungicidal treatment of textiles, leather and other materials.**—*Text. J. Aust.*, 24, 4, pp. 336, 338, 342–343; 5 pp., 410, 412, 414–418, 438–439, 1949.

This useful paper (an abbreviated version of *Circ. Def. Res. Lab.* 12, Maribyrnong, Victoria) contains much valuable information on up-to-date methods for the fungicidal treatment of textiles, leather, and other industrial materials.

Williams (A. E.). **Metallic naphthenate fungicides.**—*Text. Merc.*, 121, 3162, pp. 924, 926, 1949.

Among the fungicides applicable to textiles are the copper and zinc naphthenates. At the Transvaal Chamber of Mines Laboratories the following percentages of control were obtained in experiments with canvas inoculated with *Stachybotrys* sp.: 4·2 per cent. zinc naphthenate 87, the same at 8·4 per cent. 100, 4·2 per cent. copper naphthenate 100, and the same at 8·4 per cent. 85, the corresponding figures for *Chaetomium globosum* being 91, 100, 92, and 98, respectively. The untreated pieces were completely rotted.

At the Marine Biological Association, a 2-in. sisal rope, after 24 hours' immersion in copper naphthenate, was exposed for 12 months in Plymouth Sound. At the end of the period the tensile strength of the treated material was estimated at 82 per cent. of the original and that of the untreated control at 13 per cent.

These metallic naphthenates have been developed in Great Britain by Cuprinol Ltd. [cf. *R.A.M.*, 22, p. 4]. For the bulk treatment of fabrics they recommend 'micronil', a non-inflammable, oil-in-water emulsion, in which the disperse phase is a concentrated solution of metallic naphthenates containing about 50 per cent. metallic soaps. Its pH value is 6·8 and its specific gravity 1. For complete protection 0·5 to 0·75 per cent. copper or zinc is requisite, but for the simple

mildew-proofing of fabrics not intended for severe exposure conditions 0·1 per cent. is sufficient.

In order to ascertain the degree of dilution needed with the metallic naphthenates, the average take-up by fabrics of different weights is first determined by a procedure which is briefly described. The percentages are as follows: 10 oz., 100 to 150; 10 to 15 oz., 80; 15 to 20 oz., 50 to 60; above 20 oz., 40. The preservative may then be appropriately diluted so that the correct amount of preservative reaches the fabric. For instance, with a take-up of 50 per cent. 0·8 per cent. copper in the diluted metallic naphthenate, the percentage of copper in the cloth will be 0·4 per cent. The preservatives should be applied with a padding mangle operated at a reasonable speed, and the fabric may be dried, at a temperature not exceeding 100° C., in dryers or by festooning.

Cotton and jute canvas tend to decay rapidly as a result of microbiological infection. In a recent test, two samples from a 16-oz. piece were buried in the ground. After six weeks the untreated sample showed marked signs of decay, whereas that treated with cuprinol-type metallic naphthenate was still intact after eight months. Small canvas articles may be brushed with the preservative, but in bulk operations the fabric is passed rapidly through a bath and then through a pair of padded steel or wooden rollers to remove any surplus disinfectant. Large-scale preservation is carried out with a non-inflammable emulsion diluted with water in the normal way. A wetting-out agent, e.g., igepon T [ibid., 25, p. 4], perminal W, or lissapol T, may be used to facilitate penetration where necessary. Jute and hessian may be proofed at the source of manufacture by the substitution of the appropriate metallic naphthenate solution for the water used in the damping operation immediately before calendering. The application of tar, creosote, or wax to the treated materials may serve to retard the loss of metal where protracted submergence in the soil is contemplated.

White (W. L.), Mandels (G. R.), & Siu (R. G. H.). **Fungi in relation to the degradation of woollen fabrics.**—*Mycologia*, 42, 2, pp. 199–223, 6 figs., 1 diag., 1950.

Of nine common moulds tested on steam-sterilized wool serge at the United States Army Quartermaster Laboratories, all except two caused a decrease in tensile strength, *Fusarium moniliforme* [*Gibberella fujikuroi*] exhibiting the strongest action. *Aspergillus unguis* and *A. niger* caused a pronounced and a slight increase, respectively [cf. *R.A.M.*, 28, p. 188]. *A. terreus*, *Penicillium simplicissimum*, *Pestalotia* sp., and *Trichoderma viride*, which break down cotton fabrics, all grew on steam-sterilized wool serge, but could not attack the fibres. Unsterilized wool fibres were not attacked by ten miscellaneous fungi and one actinomycete, but were decomposed by *Microsporum gypseum*. In a further experiment only this fungus and *Myrothecium verrucaria* [ibid., 27, p. 259] degraded non-autoclaved wool while all the fungi tested attacked the autoclaved wool. The addition of yeast extract to the medium accelerated degradation by *Memnoniella echinata* [ibid., 29, p. 166]. The pH of the media, where the wool was attacked, increased according to the amount of degradation. Species of *Microsporum* and *Trichophyton* were the only dermatophytes significantly able to degrade autoclaved and non-autoclaved wool.

The systematic relationships of six isolates from woollen fabric and one from a tent top, which have the general morphology of the conidial state of *Ctenomyces*, are discussed.

The authors conclude that the fungi attacking wool are relatively few compared with those attacking cotton materials. Those capable of rapidly degrading wool are commonly found in the conidial state only, are similar or allied to the dermatophytes, and are probably Gymnoascaceous derivatives. The common moulds of industrial and military materials do not as a rule attack wool.

Barnett (H. L.), Timnick (Margaret B.), & Lilly (V. G.). **Method of inoculation and the production of spores by Guignardia bidwellii and other fungi in culture.**—Abs. in *Phytopathology*, 40, 1, p. 1, 1950.

The inoculation of suitable agar media at one point with mycelium or a few conidia of *Guignardia bidwellii* [the causal organism of black rot of vine] resulted in the growth of a luxuriant mycelium, which produced large pycnidia containing numerous conidia after 10 to 20 days. A scanty aerial mycelium developed on media flooded with a heavy conidial suspension, but after three days the entire surface was covered with conidia borne directly on the mycelium without the formation of pycnidia. Essentially the same results were secured with a suspension of finely cut mycelium. Leaching of nutrients from cultures by continuous flow of water led to rapid production of conidia on germ-tubes and young mycelium, whereas sporulation was delayed or prevented by a continuous flow of nutrient solution. Evidently the competition arising from a multiplicity of growing points on agar media soon depletes the nutrient supply, inducing conditions adverse to further vegetative growth but conducive to sporulation. Under these conditions such changes proceed so rapidly as to preclude the formation of definite pycnida. A similar response was elicited from *Glomerella cingulata*, *Endothia parasitica*, and certain other fungi.

Peppin (S. G.). **Seed Potato certification in Canada.**—*Amer. Potato J.*, 27, 3, pp. 93–96, 1950.

This historical survey of seed potato certification in Canada [*R.A.M.*, 28, p. 479] deals with the origin of the scheme, production, regulations governing seed certification, and distribution.

Hastings (R. C.). **How much certified seed is needed and the problem of meeting this demand.**—*Amer. Potato J.*, 27, 2, pp. 47–52, 1950.

During 1948 the acreage for production of certified seed potatoes in the United States was 46 per cent. higher than the average figure for the years 1937 to 1946, though there was a 25 per cent. reduction in the total potato acreage. All acreages of potatoes should be planted with certified seed. Assuming that it takes 25 bush. to plant the average acre, then the certified crop in 1948 was more than sufficient to plant the total U.S. acreage in 1949. Still less seed will be needed for 1950.

Larson (R. H.) & Albert (A. R.). **Relation of Potato varieties to incidence of physiological internal tuber necrosis.**—*Amer. Potato J.*, 26, 12, pp. 427–431, 1949.

In further field investigations at Hancock Station, Waushara County, Wisconsin, carried out since 1944, the incidence of physiological internal necrosis in different potato varieties [*R.A.M.*, 25, p. 275] was determined immediately after harvest. Over a period of years considerable variation in relative susceptibility was observed, but a comparison of the disease indices (5 year average) showed that Triumph, Waseca, Setapa, Placid, Desota, and Marygold were unaffected, while Kasota, La Salle, Hebron, Virgil, Red Warba, Kennebec, Empire, Teton, and Pontiac were affected much less than Menominee, Earliest of All, Erie, and Gold Coin. In order of increasing susceptibility the varieties most severely affected were Ontario, Hindenburg, Patomac [? Potomac], Pawnee, Russet Rural, and Katahdin. In the 1949 plantings of Ontario throughout Wisconsin in all types of soil the incidence of severe internal necrosis was very high. Pontiac, Katahdin, Chippewa, and Cobbler when grown adjacent to Ontario on muck soils remained unaffected. Among the English varieties tested King Edward and Up-to-Date consistently showed a low necrotic index, while Arran Scout, Great Scot, Epicure, Arran Consul, and Majestic were the most susceptible in Central Wisconsin [cf. ibid., 23, p. 89].

Larson (R. H.). **The spread of ringspot virus X by cutting knife.**—*Amer. Potato J.*, 27, 2, pp. 53–54, 1950.

In experiments at the University of Wisconsin under controlled conditions in the greenhouse, inoculation of virus-free Katahdin seedling potato tubers by cutting with a knife infected with a clear ring isolate of potato virus X [*R.A.M.*, 27, p. 150 and next abstract] resulted in 2·4 per cent. transmission when contact with sprouting eyes was avoided and 52 per cent. transmission when at least two sprouted eyes were cut.

Ladeburg (R. C.), Larson (R. H.), & Walker (J. C.). **The ringspot type of Potato virus X.**—*Amer. Potato J.*, 26, 12, pp. 432–435, 1949.

Inoculations from Chippewa, Sebago, Red Warba, Pontiac, and Katahdin potatoes affected by the ring spot type of virus X [*R.A.M.*, 23, p. 240; 28, p. 319; 29, p. 274 and preceding abstract] to *Nicotiana rustica* and Havana tobacco 38 at 24° C. usually gave only severe ring spot symptoms, but two other strains of the virus were also isolated from some of these plants, one a ring type with a necrotic border and the other a necrotic spot or local lesion type. All three caused characteristic symptoms on *N. rustica*, tobacco, and *N. glutinosa* at 24°, but only necrotic spot type local lesions at 16°. When combined with the common strain of potato virus Y they caused spot necrosis on tobacco, and when mixed with tobacco virus 1 [tobacco mosaic virus] produced streak on tomato.

Ring spot isolates from severely affected field potatoes and from apparently healthy greenhouse potatoes, and four ring spot cultures from other laboratories (virulent latent virus from Early Rose, severe X from British Queen, a severe strain from Arran Peak, and a ring spot type from naturally infected chilli pepper) when inoculated into X-free plants of recently introduced potato varieties at 16° all caused local lesions followed by severe systemic symptoms. The response of Red Warba and Pontiac was very necrotic and the inoculated plants mostly died, whereas Ontario showed mainly mottle and crinkle, with moderate flecking of the foliage. The isolates originally obtained from symptomless plants of older varieties were as virulent on X-free potatoes as those from potatoes with severe symptoms. The original sap mixture of mottle and ring spot found in symptomless Irish Cobbler, Triumph, and Russet Rural caused definite symptoms, though less severe than pure ring spot, on inoculation to X-free potato plants, and the complex was recovered unchanged from first and second generation plants. Although the strains used all had similar properties the one from chilli lacked an antigenic fraction possessed by ten isolated from potato. Field inoculations of recently introduced varieties caused severe symptoms in the first and second years but attenuation set in in the third year. Since older varieties carry a latent mild type of X, they do not develop symptoms on inoculation with the ring spot strains. Some plants of Chippewa and Sebago responded partially to greenhouse inoculation, though they contained virus X. This incomplete protection resulted from delayed movement of the latent virus from the tuber to the aerial parts in sufficient concentration to prevent entry of the ring spot virus. Such delayed movement tends to make tests for the presence of virus X unreliable when based on sprouts or young plants.

Bercks (R.). **Serologische Untersuchungen über das X-virus in Kartoffelpflanzen.** [Serological studies on the X-virus in Potato plants.]—*Phytopath. Z.*, 16, 1, pp. 71–85, 1949.

In experiments at the Gliesmarode (Brunswick) branch of the Biological Institute, using the 'leaflet' method, involving the desiccation of sera on paper, the diffusion of the X-virus in secondarily infected potato plants could be easily followed

[*R.A.M.*, 28, p. 413]. Very young Erstling [Duke of York] plants reacted negatively to the tests, both in the greenhouse and out-of-doors, irrespective of the minimum length of the stems. In the outdoor plants the virus soon accumulated to a sufficient extent to be serologically detectable in all the leaves, with the partial exception of the apical, but in the greenhouse the process was slower, though ultimately permeation also became complete under these conditions. Even the yellow leaves of withering Duke of York plants gave an unquestionably positive reaction to the virus test, whereas Prisca foliage in a comparable stage responded negatively.

The virus of the Cs 35 strain of virus X [ibid., 28, p. 414], cultured in tobacco and inoculated into healthy Flava potato plants, could barely become established in the latter, so that the question of permeation after primary infection could not be studied. It would seem fair to assume, therefore, that the viruses on tobacco and potato are not fully identical [cf. preceding abstract].

Köhler (E.). **Die Kartoffelsorte Flava nicht immun gegen das A-Virus.** [The Potato variety Flava not immune from the A-virus.]—*NachrBl. biol. ZentrAnst. Braunschw.*, 1, 12, p. 173, 1949.

The opinion expressed by the author [*R.A.M.*, 27, p. 123] as to the immunity of the Flava variety from potato virus A has been shown by further grafting experiments, using Allerfrüheste Gelbe as stocks and *Solanum demissum* as an indicator plant [ibid., 25, p. 413], to be erroneous. Not only is the virus not inactivated but it actually multiplies in Flava.

Rippel (K.). **Die Inaktivierung des Blattrollvirus durch Nucleinsäure und die Überführung des Blattrollvirus in Kräuselmosaik (A-Virus) durch ein proteolytisches Ferment bei Solanum tuberosum.** [The inactivation of the leaf roll virus by nucleic acid and the transformation of the leaf roll virus into crinkle mosaic (A-virus) by a proteolytic enzyme in *Solanum tuberosum*.]—*Naturwissenschaften*, 36, 6, pp. 188, 1949.

At the Bavarian Plant Breeding Institute, Weihenstephan, the writer investigated the possibility of combating potato leaf roll virus with nucleic acid as follows. The infected potato tubers of one lot were perforated with a borer and the cavity filled with an aqueous concentrate of nucleic acid; into those of another, similarly pierced, a solution of papayotin (Merck) was introduced, the cavities being sealed with potato plugs. The plants arising from those treated with nucleic acid were completely healthy, showing that the virus had been inactivated, presumably in the cells of its host. On the other hand, the plants produced by papayotin-treated tubers developed typical symptoms of virus A, indicating a change, hitherto regarded as impossible, in the pathogenic character of the leaf roll virus.

Hausbrandt (Ludmiła). **Próby oceny zdrowotności ziemniaka na podstawie badania białka bulw metodami : optyczną i serologiczną.** [Optical and serological methods of testing Potato viruses in Potato tubers.]—*Acta Soc. Bot. Polon*, 19, 1, pp. 84–100, 1948. [Received September, 1949.]

Experiments were carried out at the State Institute of Hygiene and on the experimental plots of the Principal School of Rural Economy at Warsaw from 1941 to 1944, using material obtained in 1939 from Cambridge (England), U.S.A., and the Netherlands, and later in 1940 from the Mory Experimental Station (Poland). It comprised tubers of several potato varieties containing viruses X, Y, Y+X, A+X, A, and aucuba mosaic. Tubers were planted and observations made through the season, one half of each harvested tuber was tested and other half planted next season. This was repeated for three years. Protein extracts for both optical and serological tests were obtained by Stanley's method for tobacco mosaic with some

modifications. About 5 ml. of purified protein extract in a flat-bottomed vessel were observed through crossed nicols, a current flow in the liquid being produced by the action of a pump through a fine glass jet [*R.A.M.*, 12, p. 525]. The scale for estimating the light intensity was worked out using different dilutions of tobacco protein containing tobacco mosaic virus. Comparing the results of these tests with the observations of plants during growing seasons the author concludes that only a positive result can be regarded as certain, proving presence of virus in tuber. A negative test does not mean necessarily that the resulting plant will be healthy.

In serological investigations the complement-fixation test was used. Extracts of proteins from tubers served as antigens and Turkish pepper [? *Capsicum* sp.] infected with virus X was used as virus host for sensitization and testing, and the extract from it served for serum preparation. It reacted negatively with antigens from healthy tubers and also nearly always negatively with those containing virus Y. Positive reaction was obtained in cases of viruses X and X+Y. A and A+X were indecisive, giving sometimes positive and sometimes negative results. From the limited number of tests the author concludes that complement-fixation test should give 100 per cent. differentiation between virus and non-virus antigens, and it appears to be the best method of identifying different virus strains.

Broadbent (L.). **The correlation of aphid numbers with spread of leaf roll and rugose mosaic in Potato crops.**—*Ann. appl. Biol.*, 37, 1, pp. 58–65, 2 graphs, 1950.

An analysis of the results of experiments carried out in various parts of England and Wales from 1941 to 1947 on the spread of potato leaf roll and rugose mosaic (virus Y) [*R.A.M.*, 28, pp. 301, 303] showed that a correlation exists between the spread of leaf roll and the number of alate *Myzus persicae* caught on sticky traps throughout the potato-growing season [see next abstract]. The correlation of spread of rugose mosaic was less, possibly because other aphid species also transmit the virus. With both diseases higher correlations were obtained when infector plants were dispersed among the healthy ones than when they were placed together in a row. It is concluded that it is possible to predict, from average trap data, what the average health of potato stocks is likely to be in the following year, and further work may enable a prediction to be made of the health of individual stocks.

Bald (J. G.), Norris (D. O.), & Helson (G. A.). **Transmission of Potato virus diseases. VI. The distribution of the aphid vectors on sampled leaves and shoots.**—*Aust. J. agric. Res.*, 1, 1, pp. 18–32, 1950.

From further studies on potato virus diseases [cf. *R.A.M.*, 26, p. 258] results are presented on the distribution of the aphid vectors *Macrosiphum gei* and *Myzus persicae* on potato plants during six seasons (1941–1947) [cf. ibid., 29, p. 274 and preceding abstract]. The distribution of adult aphids was random, that of the nymphs non-random. The influences producing non-random distribution are discussed. A modified procedure is suggested for sampling aphid populations on potato crops to allow for the difference between basal leaves (touching the ground) and ground canopy leaves (shading the ground).

de Bruyn (Helena L. G.). **Het rassenprobleem bij Phytophthora infestans.** [The race problem in *Phytophthora infestans*.]—*Vakbl. Biol.*, 27, 10, pp. 147–152, 1947. [Received May, 1950.]

The problem of physiologic specialization in *Phytophthora infestans* [see next abstract] is explored in the light of 18 outstanding contributions to the subject, with special reference to that of Mills on the enhancement of pathogenicity to

tomato of the potato strain of the fungus by six or seven passages through Bonny Best tomatoes [*R.A.M.*, 20, p. 92], an experiment repeated by the author in 1946 with comparable results.

The extreme plasticity of *P. infestans*, which confers upon the fungus a high degree of adaptability to the nutritional conditions provided by a given host, greatly complicates the differentiation of physiologic races and renders the continuance of the existing ones problematical. The practical implications of the mutability of the pathogen are briefly discussed in relation to plant breeding.

Behr (L.). **Über den Einfluss von narkotisch wirkenden Stoffen auf die Wundperidermbildung und die Resistenz der Kartoffelknolle gegenüber Phytophthora infestans de By. und Vertretern der Gattung Fusarium Lk.** [On the influence of narcotically active substances on wound periderm formation and the resistance of the Potato tuber to *Phytophthora infestans* de Bary and representatives of the genus *Fusarium* Link.]—*Phytopath. Z.*, 15, 1, pp. 407–446, 4 figs., 4 diags., 3 graphs, 1949.

The author's studies were conducted at the Bureau of Applied Genetics and Breeding for Immunity of the former Biological Institute, Berlin-Dahlem, on potato tubers of the varieties BRA 23/31 (one of the 'W' group, which is highly resistant to *Phytophthora infestans* [*R.A.M.*, 29, p. 226]), BRA 6/33 (Aquila), another of the same type, with a comparable reaction to blight, and the susceptible commercial Ackersegen, Erdgold, Flava, Jubel, and Voran. The results of preliminary tests having shown little difference between the several members of the two groups in respect of their reactions to blight, only BRA 23/31 and Flava were used in the main series of experiments.

Under the influence of methyl, ethyl, *n*-propyl, and *n*-butyl alcohol, and of chloroform the tubers lose their capacity to form periderm under the surface of wounds. However, the cells of the tissues involved in this change are still living. There is no reaction to wound stimulus. The narcotic threshold concentrations for the blight-resistant 'W' and susceptible commercial varieties are identical, the values for the alcohols (which were mixed with water in varying dilutions and used as 15-minute dips for the tuber halves) being determined as follows: methyl 0·41 M, ethyl 0·051 M, *n*-propyl 0·034 M, and *n*-butyl 0·022 M. The corresponding value for chloroform vapour, applied for a period of 24 hours, was 0·17 ml. per l. air space. Blight-resistant 'W' tubers exposed to the influence of these narcotics provide the pathogen with better conditions for development than untreated. Narcosis also diminishes the resistance of the tubers to the facultative parasites, *Fusarium solani* and its var. *martii*, *F. avenaceum*, *F. culmorum*, and *F. sambucinum* [ibid., 23, p. 312], which cannot attack untreated tubers but thrive on those treated with alcohol or chloroform.

The changes in the constitution of the tubers induced by narcotization are only partially reversible. The lowering of resistance to pathogenic agencies effected by the four above-mentioned alcohols and chloroform is attributed to their prevention of the development of fungicidal protective substances ('phytoalexins') [ibid., 28, p. 415].

Rich (A. E.). **The effect of various defoliants on Potato vines and tubers in Washington.**—*Amer. Potato J.*, 27, 3, pp. 87–92, 1 fig., 1950.

Experiments carried out in 1947 and 1948 in Washington with various herbicides [against *Phytophthora infestans*: *R.A.M.*, 29, p. 169] on White Rose and Russet Burbank potatoes, demonstrated that ammonium sulphate at 200 lb. per acre in 100 gals. water is satisfactory, killing the vines of both varieties fairly rapidly with little resultant xylem discoloration (trace and 2 per cent., respectively). This

discoloration seems to occur more frequently and seriously in Washington and British Columbia than in eastern North America. Mechanical vine-shredders (rotobeaters) [ibid., 28, p. 443] cause negligible tuber discoloration and are gaining in popularity.

WHITEHEAD (S. B.). **The control of scab in Potatoes.**—*Gdnrs' Chron.*, Ser. 3, 127, 3303, p. 166, 1950.

Although there is no single method of controlling potato scab (*Actinomyces scabies*) [*R.A.M.*, 28, p. 639] the following measures should reduce its incidence. Lime should be avoided unless the soil is very strongly acid, a pH of about 5·2 usually giving freedom from scab. On chalky soils alkalinity should be depressed by the use of organic manure and acid-reacting fertilizers. It is advisable to use partially rotted manure or compost instead of fresh farmyard manure on infested soils. To guard against high soil temperatures, which parallel high incidence, ample organic manure must be used in the drills and the seed tubers set in or under the material. In sandy soils the tubers should be covered with an inch or two of lawn mowings if there is insufficient compost or rotted manure available, and they should be well earthed up. Where scab has persisted for more than two years the contaminated site should not be planted with potatoes, beets, turnips, or radishes for at least two years.

ROUATT (J. W.) & ATKINSON (R. G.). **The effect of the incorporation of certain cover crops on the microbiological balance of Potato scab infested soil.**—*Canad. J. Res.*, Sect. C, 28, 1, pp. 140–152, 1950.

The decomposition of soy-bean, rye, and red clover plants in soil naturally infested with the potato scab organism (*S[treptomyces* (*Actinomyces*)] *scabies*) [*R.A.M.*, 28, p. 539] in Ontario resulted in marked quantitative and qualitative changes in the microflora, but only soy-bean compost decreased scab incidence [ibid., 28, p. 440]. The numbers of bacteria, actinomycetes, and fungi were mostly increased by soy-bean, followed by red clover and rye, the latter, however, having no effect on actinomycetes. Tubers in all cases supported a higher population of organisms than the corresponding soils. In the soy-bean soil bacteria requiring amino acids were preferentially stimulated and markedly increased on the tubers, while those with more complex requirements were relatively suppressed [cf. ibid., 27, p. 41]. Fungi requiring amino acids were also somewhat increased, while those with simple nutrient requirements were correspondingly decreased. A similar effect occurred in the rye soil. On the other hand, fungi requiring amino acids were completely suppressed on the tubers in the soy-bean soil, were increased above soil values in the rye soil, and preferentially stimulated only in the untreated soil. The bacterial balance index [ibid., 28, p. 21] showed a relationship with degree of infection, the high index in the soy-bean soil being associated with least scab, especially on the tubers.

BOUCHEREAU (P.) & ATKINS (J. G.). **Studies on the action of copper seed treatments for water-planted Rice.**—Abs. in *Phytopathology*, 40, 1, p. 3, 1950.

In laboratory experiments in Louisiana the treatment of rice grain with yellow cuprocide failed to improve germination, but seedling survival was increased in tests with *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: cf. *R.A.M.*, 29, p. 276] or naturally infested field soil. The treatment also stimulated root and shoot growth. Rice treated with the fungicide at 1, 2, and 4 oz. per bush. was stored and tested at monthly intervals. After seven months the copper contents of the roots and shoots of seedlings grown from treated grains were, respectively, eight and nine times higher than in those from untreated.

Carpenter (J. B.). **Production and discharge of basidiospores of Pellicularia filamentosa (Pat.) Rogers on Hevea Rubber.**—*Phytopathology*, 39, 12, pp. 980–985, 1949.

A study of the production and discharge of basidiospores by *Pellicularia filamentosa* [*Corticium solani*], the agent of a leaf spot of *Hevea* rubber and other species in eastern Peru [*R.A.M.*, 29, p. 329], is described and the resultant data tabulated. Under natural light sporulation by the rubber strain of the fungus, both on infected foliage and *in vitro*, appears to be a periodic function, with the maximum basidiospore discharge occurring at night and a low to negligible rate in the daytime. For example, in a test begun on 12th January, 1949, the numbers per sq. cm. released from detached leaf pieces (using an average of six leaves) on the second day from 6 p.m. to midnight, midnight to 6 a.m., 6 a.m. to noon, and noon to 6 p.m. were 15,271, 8,338, 143, and 759, respectively, on the third day 13,078, 9,625, 305, and 369; and on the fourth day 13, 123, 6,713, and 254 (observed till 8 a.m. only). On the fifth day of a soil agar culture experiment with five replicates, under natural light, the average numbers of basidiospores discharged per sq. cm. during similar periods were 2,309, 5,779, 32, and 0, respectively.

No critical temperatures were encountered within the range of 21·5° to 28° C. The high degree of humidity prevailing in the Peruvian rubber-growing areas is very conducive to the persistence and pathogenicity of the fungus.

Sheffield (F[rances] M. L.). **Studies of the Clove tree. 2. Histology, with special reference to sudden death disease.**—*Ann. appl. Biol.*, 37, 1, pp. 23–45, 3 pl., 4 figs., 1950.

This is an amplified account of anatomical studies of clove trees (mostly in Zanzibar and some from Pemba) in connexion with sudden death disease [see above, p. 350]. The apparently healthy tree differs from a typical dicotyledon in having bicollateral vascular bundles with secondary thickening in the internal phloem, necrosis of the formed cells keeping pace with the production of new cells. Development and lignification of the xylem are very uneven and unrelated to season. Tyloses occur in the vessels, starch reserves are small, but quantities of tannins, oils, and calcium oxalate are present in all tissues. Occasional dead cells are found in all tissues even the primary meristem. The leaf plastids develop very unevenly and retarded pigment formation resulted in a flecked appearance. Inclusion bodies, abundant in the leaves, differ chemically from virus inclusion bodies.

Several fungi were isolated from the absorbing roots, but as few hyphae were present before the tree wilted, they would appear to be secondary. Nothing incompatible with the hypothesis that sudden death is of virus origin was found.

Steib (R. J.) & Chilton (S. J. P.). **Phytophthora rot of Sugar-Cane seed pieces.**—Abs. in *Phytopathology*, 40, 1, p. 26, 1950.

One of the tree types of *Phytophthora*-like cultures consistently isolated from rotted sugar-cane seed pieces in Louisiana was identified as *P. erythroseptica*. The other two remain to be determined. The disease, which was widespread throughout the State, was associated with poor drainage and relatively low temperatures [cf. *R.A.M.*, 25, p. 8]. Inoculation experiments resulted in symptoms resembling those observed in the field, and the necessity of high soil moisture for severe stalk infection was also demonstrated.

Chu (H. T.). **Effect of hot water treatment on the control of downy mildew on Cane seed pieces.**—*Rep. Taiwan Sug. Exp. Sta.*, 3, pp. 227–231, 1948. [Chinese, with English summary. Received March, 1950.]

Downy mildew (*Sclerospora sacchari*) [*R.A.M.*, 28, p. 142] is one of the most

important sugar-cane diseases in Formosa. It was introduced in Australian cuttings about 1909 and recurs annually, some fields having as much as 43·5 per cent. infection. After hot water treatment (52° C.) for one hour diseased cuttings gave rise to 94·7 to 100 per cent. healthy stools, and when the treatment was preceded by immersion of the cuttings in water at 40° to 46° for one hour an almost complete control was obtained.

Liu (H. P.). **A comparative study of inducing mosaic infection in Sugar Cane by various inoculating methods.**—*Rep. Taiwan Sug. Exp. Sta.*, 4, pp. 210–220, 1949. [Chinese, with English summary.]

In comparing various techniques for the inoculation of sugar-cane with mosaic virus [*R.A.M.*, 29, p. 121], the author found that a modification of Matz's method [ibid., 12, p. 660] was the most satisfactory. About four drops of extracted viruliferous juice were dropped into the axil of the youngest open leaf, and the tight roll of young leaves was pricked 100 times through the inoculum with a steel needle (0·2 mm. in diameter). The incubation period was 19·8 days and the average infection 95 per cent.

Stevenson (G. C.). **Report on a visit to the Dominican Republic, August, 1949.**—*Bull. Brit. W. Ind. centr. Sug. Cane Breed. Sta.* 30, 12 pp., 1949.

Mosaic is by far the most important disease of sugar-cane in the Dominican Republic [*R.A.M.*, 28, p. 545]. In a variety trial at Ozama B. 37161, cut in the 1949 crop as first ratoons, was outstanding as it had been heavily rogued as plant cane to control the disease. M. 366, a seedling from M. 28 × P.O.J. 2878, is virtually immune from mosaic, B. 41211 is resistant to the Barbados strain, B 41227 is highly resistant in Jamaica, and B. 44341 appears to be immune in Barbados.

The new varieties from Barbados should be multiplied as rapidly as possible and tested in formal variety trials in the major soil types. At present rogueing of varietal plots to control mosaic is not worth while.

Cohen (C.). **The occurrence of fungi in the soil, after different burning and grazing treatments of the veld in the Transvaal.**—*S. Afr. J. Sci.*, 46, 8, pp. 245–246, 1950.

This is a slightly expanded account of work already noticed from another source [*R.A.M.*, 28, p. 642].

Nicolas (G.) & Aggéry [Berthe]. **Notes phytopathologiques (septième note).** [Phytopathological notes (seventh note).]—*Bull. Soc. Hist. nat. Toulouse*, 84, 3–4, pp. 134–144, 1949.

In this further contribution to the present series [cf. *R.A.M.*, 28, p. 360], among the fungi listed is *Uromyces terebinthi* [ibid., 27, p. 114], found on *Pistacia terebinthus* [a variety of which produces a superior resin] at Molitz-les-Bains in September, 1948.

Da Camara (E. de S.). **Mycetes aliquot Lusitaniae. VII.** [Some fungi of Portugal.] —*Agron. lusit.*, 9, 2, pp. 85–128, 2 pl., 1947. [Received March, 1950.]

In this further critically annotated list of 142 Portuguese fungi [cf. *R.A.M.*, 25, p. 47] are a number of new records for Portugal, including *Septoria petroselini* on parsley [ibid., 27, p. 349], *S. piricola* [*Mycosphaerella sentina*] on pear [ibid., 27, p. 425], *Stigmina platani* [*M. stigmina-platani*: ibid., 17, p. 492] on *Platanus orientalis*, and *Ramularia vallisumbrosae* [ibid., 29, p. 261] on *Pancratium maritimum*.

THIRUMALACHAR (M. J.). **Some noteworthy rusts. III.**—*Mycologia*, 42, 2, pp. 224–232, 8 figs., 1950.

Descriptions are given of a third collection of rusts from South India [cf. *R.A.M.*, 26, p. 470], including one new genus and two new species. *Hapalophragmiopsis ponderosum* n. comb. (syn. *Hapalophragmium ponderosum* Syd. & Butler) [ibid., 21, p. 233], which causes the production of large galls on *Acacia leucophloea*, is the type species of the new genus.

Regulations for the enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act.—*S.R.A., P.M.A., U.S. Dep. Agric.*, 166, 17 pp. 1949.

Directions are given concerning the definition of terms used in these regulations, labelling requirements, ingredient statements, highly toxic economic poisons and their labelling requirements, registration of purveyors of economic poisons, coloration and discoloration requirements, adulteration, misbranding, enforcement of sample production, shipments for experimental use, and exemptions from some of the above, followed by the text of the Act itself.

Annual Report of the Sarawak Department of Agriculture for the year 1948.—65 pp., 1 map, 1949.

On p. 17 of this report it is stated that owing to the possible menace of South American leaf disease of *Hevea* rubber [*Dothidella ulei*], regulations have been introduced prohibiting the import into Sarawak of any species of plant from South America or any rubber plant from any country without permission from the Director of Agriculture.

A similar prohibition has been placed on the importation of Manila hemp [*Musa textilis*] to prevent introduction of [abacá] bunchy top [virus], and of diseased [unspecified] cacao planting material.

Verordnung zur Bekämpfung der Viruskrankheiten der Kartoffel. [Order for the Control of Potato Virus Diseases.]—*Pflanzenschutz*, 1, 7, pp. 89–90, 1949.

The Order for the Control of Potato Virus Diseases in Bavaria of 14th February, 1949, falls into two main sections, the first comprising measures for the extermination of the insect vector (*Myzodes* [*Myzus*] *persicae*) [*R.A.M.*, 28, p. 585; 29, p. 225], and the second those designed to reduce the risk of infection from diseased stands.

The following are among the provisions of part I. It is incumbent upon owners of peach trees to spray them during the winter months with officially approved plant-protectives and also to register with the local police authorities every year before 1st October the peach trees on their property. If the prescribed spraying operations are neglected or inadequately carried out, the local authorities are empowered to remove the trees at the owner's cost. In 'closed' seed potato areas (in which the crop is grown for large-scale seed production) the foregoing regulations are also applicable to apricot trees, and orders for spraying both peaches and apricots during the growing period may be issued at the discretion of the authorities if the aphid situation demands such measures. In these districts, moreover, nurserymen are required to note the development of aphids, especially *M. persicae*, on vegetables and ornamentals under glass and to treat the plants accordingly. The cultivation and replanting of peach and apricot trees in 'closed' areas is prohibited.

Part II of the Order provides for the rejection as seed of tubers from fields harbouring more than 10 per cent. severely virus-diseased plants, even where the diseased material is subsequently eliminated. The owners of such fields must supply the authorities before 1st May of the following year with the necessary proofs that they are using certified seed. The exclusive use of certified seed in all fields of 'closed' districts may be ordered at the discretion of the authorities.